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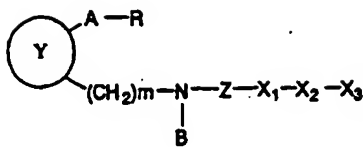
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심사청구 : 없음

(54) 비사이클릭 아미노 유도체 및 이들을 함유하는 프로스타글란딘 D₂ 길항제

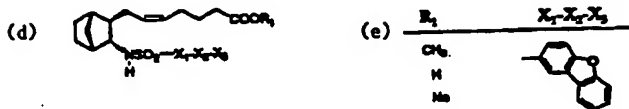
요약

하기 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물(예를 들면, (e)의 조건을 갖는 (d) 화합물)은 프로스타글란딘 D₂ (PGD₂)의 길항제로서 유용하고, 비만 세포의 기능 부전을 포함하는 질병(예: 전신성 비만 세포 증식성 비만 세포 활성화 증후군) 및 관련 증상(예: 알레르기성 비염, 알레르기성 결막염, 두드러기, 천식 등)의 치료에 유용하다.



상기 식에서,

(a)는 (b) 또는 (c)이다.



명세서

기술분야

본 발명은 비사이클릭 아미노 유도체 및 이들을 함유한 프로스타글란딘 D₂(본원 이하에서는 PGD₂로 지칭)에 관한 것이다.

배경기술

본 발명의 일부 비사이클릭 아미노 유도체는 트롬복산 A₂ (TXA₂) 길항제로서 유용하다고 공지되어 있다(일본 특허 공고 공보 제 93-79060 호 참고). 그러나, 일본 특허 공고 공보 제 93-79060호에서는 상기 화합물이 TXA₂ 길항제로 유용하다고만 기술되어 있고, 본 발명에서 개시하는 바와 같이 PGD₂ 길항제로서의 그의 유용함을 제안하고 있지는 않다.

즉, TXA₂는 혈소판 응집 반응, 혈전 형성 등에 대한 작용과 같은 활성을 갖고 있다고 공지되어 있다. 따라서 TXA₂ 길항제는 항혈전제로서 유용하고, 또한 TXA₂에 대한 길항 작용에 의한 심근 경색 또는 천식의 치료에 유용하다고 생각되어 왔다.

한편, 본 발명의 PGD₂ 길항제는 PGD₂의 과도한 생성으로 인한 상태를 개선시키는데 유용하다. 특히, 비만 세포의 기능 부전을 포함하는 질병(예 : 전신성 비만 세포증 및 전신성 비만 세포 활성화의 장애) 및 기관 수축, 천식, 알러지성 비염, 알러지성 결막염, 두드러기, 허혈성 재관류로 인한 손상 및 염증의 치료용 약제로서 유용하다.

상기에서 알 수 있듯이, TXA₂ 길항제 및 PGD₂ 길항제는 활성 부위, 작용 메카니즘 및 용도에 있어서 서로 완전히 상이하고, 매우 상이한 특성을 갖는다. 따라서, 임의의 화합물이 이러한 활성을 동시에 소유하는 것은 예상하지 못했다.

PGD₂는 면역성 또는 비면역성 자극에 의해 활성화되는 사이클로옥시제네이스의 작용에 의해 아아라키돈산으로부터 PGG₂ 및 PGH₂를 거쳐 제조되며, 비만 세포로부터 생성되고 방출되는 중요한 프로스타노이드이다.

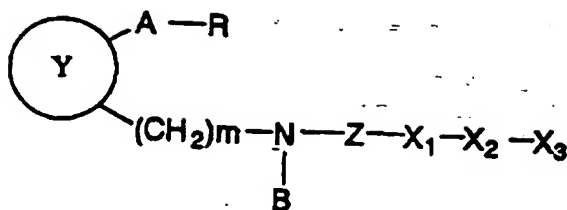
PGD₂는 강력한 여러 생리학적 및 병리학적 활성을 갖는다. 예를 들어, PGD₂는 심한 기관 수축의 원인이 되어 기관지 천식을 유발하기도 하고, 전신 알러지 상태에서 말초 혈관으로 퍼져 과민성 쇼크를 유발하기도 한다. 특히 PGD₂가 알러지성 비염에서 코 폐색의 개시에 원인이 되는 뜻밖의 물질중의 하나라는 생각에 보다 많은 주의가 집중되어 왔다. 따라서, 코 폐색증을 감소시키기 위한 약제로서 PGD₂ 또는 PGD₂ 수용체의 길항물질의 생합성에 대한 억제제를 개발하는 것이 제안되었다. 그러나, PGD₂ 생합성의 억제제는 가능하게는 다른 생물체에서의 프로스타글란딘의 합성에 상당한 영향을 미치며, 따라서 PGD₂ 수용체에 특이적인 길항제(차단제)를 개발하는 것이 바람직하다.

[발명의 요약]

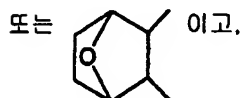
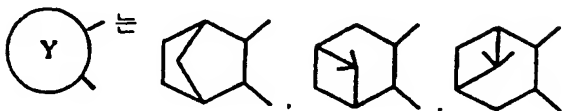
본 발명자들은 PGD₂ 수용체에 특이적인 PGD₂ 수용체 길항제(차단제)를 개발하는 것에 대해 집중 연구하여, 하기 화학식 I의 화합물 또는 그의 염이 PGD₂ 수용체 길항제로서 강력한 활성을 가지며 화학적 및 생화학적으로 안정함을 발견하였다.

따라서, 본 발명은 활성 성분으로서 하기 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물을 포함하는 PGD₂ 길항제를 제공한다:

[화학식 I]



상기 식에서,



A는 선택적으로 쇠중에 헤테로 원자 또는 페닐렌을 함유하고, 옥소기를 함유하고/ 함유하거나, 불포화 결합을 갖는 알킬렌이고;

B는 수소, 알킬, 아르알킬 또는 아실이고;

R는 COOR₁, CH₂OR₂ 또는 CON(R₃)R₄이고;

R₁은 수소 또는 알킬이고;

R₂는 수소 또는 알킬이고;

R₃ 및 R₄는 각각 독립적으로 수소, 알킬, 하이드록시 또는 알킬설폰일이고;

X₁은 단일 결합, 페닐렌, 나프틸렌, 티오펜디일, 인돌디일 또는 옥사졸디일이고;

X₂는 단일 결합, -N=N-, -N=CH-, -CH=N-, -CH=N-N-, -CH=N-O-, -C=NNHCSNH-, -C=NNHCONH-, -CH=CH-, CH(OH)-, -C(C1)=C(C1)-, -(CH₂)_n, 에틴일렌, -N(R₅)-, -N(R₅₁)CO-, -N(R

₅₂)SO₂-, -N(R₅₃)CON(R₅₄)-, -CON(R₅₅)-, -SO₂N(R₅₆)-, -O-, -S-, -SO-, -SO₂-, -CO-, 옥사디아졸디일, 티아디아졸디일 또는 테트라졸디일이고;

X₃은 알킬, 알켄일, 알킨일, 아릴, 아르알킬, 헤테로사이클릭 기, 사이클로알킬, 사이클로알켄일, 티아졸리닐리덴메틸, 티아졸리딘알리덴메틸, -CH=NR₆ 또는 -N=C(R₇)R₈이고;

R₅, R₅₁, R₅₂, R₅₃, R₅₄, R₅₅ 및 R₅₆은 각각 수소 또는 알킬이고;

R₆은 수소, 알킬, 하이드록시, 알콕시, 카바모일옥시, 티오키아모일옥시, 우레이도 또는 티오우레이도이고;

R₇ 및 R₈은 각각 독립적으로 알킬, 알콕시 또는 아릴이고;

n은 1 또는 2이고;

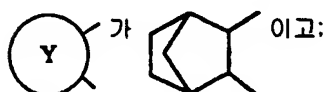
Z는 -SO₂- 또는 -CO-이고;

m은 0 또는 1이며;

이때, 사이클릭 치환체는 니트로, 알콕시, 설퍼모일, 치환된- 또는 비치환된-아미노, 아실, 아실옥시, 하이드록시, 할로겐, 알킬, 알킨일, 카복시, 알콕시카보닐, 아르알킬시카보닐, 아릴옥시카보닐, 메실옥시, 시아노, 알켄일옥시, 하이드록시알킬, 트리플루오로메틸, 알킬티오, -N=PPh₃, 옥소, 티옥소, 하이드록시이미노, 알콕시이미노, 페닐 및 알킬렌디옥시로 구성된 그룹중에서 선택된 1 내지 3개의 치환체를 가질 수도 있다.

발명의 상세한 설명

PGD₂ 길항제로서 사용할 수 있는 화합물의 구체적인 예로는,



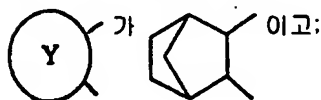
m이 0이고;

Z가 SO₂이고;

X_1 및 X_2 가 둘다 단일 결합이고;

X_3 이 알킬, 페닐, 나프틸, 스티릴, 퀴놀릴 또는 티엔알인(이들 치환체중 사이클릭 치환체는 선택적으로 니트로, 알콕시, 치환된- 또는 비치환된-아미노, 할로겐, 알킬 및 하이드록시알킬로 구성된 그룹중에서 선택된 1 내지 3개의 치환체를 가짐) 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물이 있다.

유사하게, 구체적인 예로는

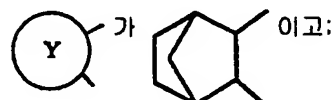


m 이 1이고;

X_1 및 X_2 가 둘다 단일 결합이고;

X_3 이 선택적으로 할로겐으로 치환된 페닐인 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물이 있다.

유사하게, 구체적인 예로는



m 이 1이고;

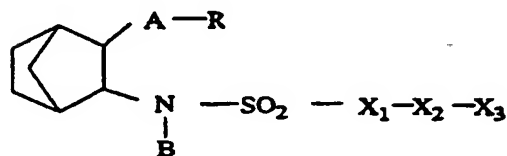
X_1 이 페닐이고;

X_2 가 $-CH_2-$ 또는 $-N=N-$ 이고;

X_3 이 페닐인 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물이 있다.

유사하게, 화학식 I의 화합물의 예로는 하기 화학식 Ia의 화합물 또는 그의 염 또는 이들의 수화물이 있다.

[화학식 Ia]



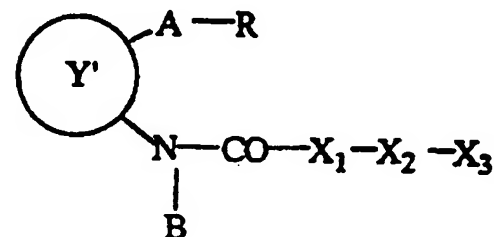
상기 식에서,

A, B, R, X_1 , X_2 및 X_3 은 화학식 I에 대하여 정의한 바와 같고,

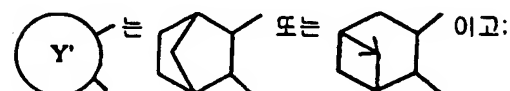
단, (1) X_1 및 X_2 가 단일 결합이고, X_3 이 치환된- 또는 비치환된-페닐 또는 나프틸인 경우와 (2) A가 5-헵텐일렌이고, R이 $COOR_1$ (이때, R_1 은 수소 또는 메틸임)이고, X_1 이 1,4-페닐렌이고, X_2 가 단일 결합이고, X_3 이 페닐인 경우를 제외한다.

유사하게, 화학식 I의 화합물의 예로는 하기 화학식 Ib의 화합물 또는 그의 염 또는 이들의 수화물이 있다:

[화학식 Ib]



상기 식에서,



A, B, R, X_1 , X_2 및 X_3 은 화학식 I에 대하여 정의한 바와 같고,

단, X_1 및 X_2 가 단일 결합이고, X_3 이 페닐인 경우와 X_1 이 단일 결합이고, X_2 가 $-O-$ 이고, X_3 이 벤질인 경우를

보다 특징하게, 화학식 I의 화합물의 예로는 X_1 및 X_2 가 단일 결합이고 X_3 이 이중사슬릴, 티아디아졸릴, 이소티아졸릴, 모릴릴, 인돌릴, 벤조푸릴, 디벤조푸릴, 디벤조디옥신일, 벤조티엔일, 디벤조티엔일, 카바졸릴, 크산텐일, 페난트리딘일, 디벤조세핀일, 디벤조티에핀일, 시놀일, 크로멘일, 벤조이미다졸릴 또는 디하이드로벤조티에핀일인 화학식 Ia의 화합물 또는 그의 염 또는 이들의 수화물을 들 수 있다.

유사하게, 화학식 I의 화합물의 예로는 R이 COOR₁이고, X₁이 페닐렌 또는 티오펜디일이고, X₂가 단일 결합, -N=N-, -CH=CH-, -CONH-, -NHCO- 또는 에틴일렌이고, X₃이 페닐, 티아졸린일리덴메틸, 티아졸리딘일리덴메틸 또는 티에일일 화학식 Ia의 화합물 또는 그의 염 또는 이들의 수화물을 들 수 있다.

Y' 가

유사하게, 화학식 I의 화합물의 예로는 X_1 이 페닐렌 또는 티오펜디일이고, X_2 가 단일 결합, $-N=N-$, $-CH=CH-$, 에틸렌, $-O-$, $-S-$, $-CO-$, $-CON(R_{55})-$ (이때, R_{55} 는 상기 정의한 것과 같음), $-N(R_{51})CO-$ (이때, R_{51} 는 상기 정의한 것과 같음)이고, X_3 이 페닐인 화학식 Ib의 화합물 또는 그의 염 또는 이들의 수화물을 들 수 있다.

Y 가

본 명세서 전체에서 사용되는 용어는 하기에서 정의하는 바와 같다.

$$_3\text{-S-(CH}_2)_2\text{-, -CH}_2\text{-S-CH}_2\text{-, -CH}_2\text{-S-(CH}_2\text{)}$$

알킬 이라는 용어는 C₁-C₂₀의 직쇄 또는 분지쇄 알칸올을 의미하고, 예외로 메틸, 에틸, n-프로판, i-프로판, 고-프로판, i-i-부탄, s-부탄, t-부탄, 고-펜탄, i-펜탄, 노오펜탄, i-펜탄, 헥사헵타, 옥타, 나논, 데카, undeca, dodeca, trideca, tetradeca, pentadeca, hexadeca, heptadeca, octadeca, eicosa가 있다.

데실, 트리데실, 테트라데실, 펜타데실, 헥사데실, 헵타데실, 옥타데실, 노나데실, 이코실 등을 들 수 있다.

'아릴'이라는 용어는 C_6-C_{14} 의 모노사이클릭 또는 축합 고리족을 의미하고, 예로는 페닐, 나프틸(예: 1-나프틸, 2-나프틸), 안트릴(예: 1-안트릴, 2-안트릴, 9-안트릴), 페난트릴(예: 2-페난트릴, 3-페난트릴, 9-페난트릴), 플루오렌일(예: 2-플루오렌일) 등을 들 수 있다. 페닐이 특히 바람직하다.

'아르알킬'이라는 용어는 알킬중 임의의 치환가능한 위치에서 상기와 같이 정의한 알킬을 상기 아릴로 치환함으로써 형성된 기를 의미한다. 예로는 벤질, 페닐, 페닐프로필(예: 3-페닐프로필), 나프틸메틸(예: α -나프틸메틸), 안트릴메틸(예: 9-안트릴메틸), 페난트릴메틸(예: 3-페난트릴메틸) 등을 들 수 있다.

'아실'이라는 용어는 지방족 카복실산으로부터 유도된 C_1-C_9 의 아실을 의미하고, 예로는 포르밀, 아세틸, 프로피온일, 부틸릴, 발레릴 등을 들 수 있다.

'알킬설폰일'이라는 용어는 설폰일을 상기 알킬로 치환함으로써 형성된 기를 의미하고, 예로는 메틸설폰일, 에틸설폰일, 프로필설폰일 등을 들 수 있다.

'알켄일'이라는 용어는 C_2-C_{20} 의 직쇄 또는 분지쇄 알켄일을 의미하며 이는 하나 이상의 이중 결합을 함유하는 상기 알킬에 해당된다. 예로는 비닐, 1-프로펜일, 2-프로펜일, 1-부텐일, 2-부텐일, 3-부텐일, 1,2-부타디엔일, 1-펜텐일, 1,2-펜타디엔일, 2-헥센일, 1,2-헥사디엔일, 3-헵텐일, 1,5-헵타디엔일 등을 들 수 있다.

'알킨일'이라는 용어는 C_2-C_{20} 의 직쇄 또는 분지쇄 알킨일로서 하나 이상의 삼중 결합을 함유하는 상기 알킬에 해당된다. 예로는, 에틴일, 1-프로핀일, 2-프로핀일, 1-부틴일, 2-부틴일, 3-부틴일 등을 들 수 있다.

'헤테로사이클릭 기'란 고리상에 산소, 황 및/또는 질소 원자로 구성된 그룹에서 독립적으로 선택된 하나 이상의 헤테로 원자를 함유하는 5원 내지 7원의 사이클릭 고리족을 의미하며, 선택적으로 임의의 치환가능한 위치에서 탄소 고리 또는 다른 헤테로사이클릭 기와 축합된다. 예로는, 피롤일(예: 1-피롤일, 3-피롤일), 인돌일(예: 2-인돌일, 3-인돌일, 6-인돌일), 카바졸일(예: 2-카바졸일, 3-카바졸일), 이미다졸일(예: 1-이미다졸일, 4-이미다졸일), 피라졸일(예: 1-피라졸일, 3-피라졸일), 벤즈이미다졸일(예: 2-벤즈이미다졸일, 5-벤즈이미다졸일), 인다졸일(예: 3-인다졸일), 인돌리진일(예: 6-인돌리진일), 피리달일(예: 2-피리달일, 3-피리달일, 4-피리달일), 퀴놀일(예: 8-퀴놀일), 이소퀴놀일(예: 3-이소퀴놀일), 아크리달일(예: 1-아크리달일), 페난트리딘일(예: 2-페난트리딘일, 3-페난트리딘일), 피리다진일(예: 3-피리다진일), 피리미딘일(예: 4-피리미딘일), 피라지일(예: 2-피라지일), 시놀린일(예: 3-시놀린일), 프탈라딘일(예: 5-프탈라딘일), 쿠나졸린일(예: 2-쿠나졸린일), 이속사졸일(예: 3-이속사졸일, 4-이속사졸일), 벤즈이속사졸일(예: 1,2-벤즈이속사졸-4-일, 2,1-벤즈이속사졸-3-일), 옥사졸일(예: 2-옥사졸일, 4-옥사졸일, 5-옥사졸일), 벤즈옥사졸일(예: 2-벤즈옥사졸일), 벤즈옥사디아졸일(예: 4-벤즈옥사디아졸일), 이소티아졸일(예: 3-이소티아졸일, 4-이소티아졸일), 벤즈이소티아졸일(예: 1,2-벤즈이소티아졸-3-일, 2,1-벤즈이소티아졸-5-일), 티아졸일(예: 2-티아졸일), 벤조티아졸일(예: 2-벤조티아졸일), 티아디아졸일(예: 1,2,3-티아디아졸-4-일), 옥사디아졸일(예: 1,3,4-옥사디아졸-2-일), 디하이드로옥사디아졸일(예: 4,5-디하이드로-1,2,4-옥사디아졸-3-일), 푸릴(예: 2-푸릴, 3-푸릴), 벤조푸릴(예: 3-벤조푸릴), 이소벤조푸릴(예: 1-이소벤조푸릴), 티엔일(예: 2-티엔일, 3-티엔일), 벤조티엔일(예: 1-벤조티엔일-2-일, 2-벤조티엔일-1-일), 테트라졸일(예: 5-테트라졸일), 벤조디옥솔일(예: 1,3-벤조디옥솔-5-일), 디벤조푸릴(예: 2-디벤조푸릴, 3-디벤조푸릴), 디벤즈옥세핀일(예: 디벤조[b,f]옥세핀-2-일), 디하이드로디벤즈옥세핀일(예: 디하이드로디벤조[b,f]옥세핀일-2-일), 크로엔일(예: 2H-크로엔-3-일, 4H-크로엔-2-일), 디벤조티에핀일(예: 디벤조[b,f]티에핀-3-일, 디하이드로디벤조[b,f]티에핀-3-일), 모폴린일(예: 1,4-모폴린-4-일), 페노티아딘일(2-페노티아딘일), 사이클로펜타티엔일(예: 사이클로펜타[b]티엔일-3-일), 사이클로헥사티엔일(예: 사이클로헥사[b]티엔일-3-일) 등을 들 수 있다.

'사이클로알킬'이라는 용어는 C_3-C_8 의 사이클릭 알킬을 의미하고, 예로는 사이클로프로필, 사이클로부틸, 사이클로펜틸, 사이클로헥실 등을 들 수 있다.

'사이클로알켄일'이라는 용어는 C_3-C_8 의 사이클릭 알켄일을 의미하고, 예로는 사이클로프로펜일(예: 1-사이클로프로펜일), 사이클로부텐일(예: 2-사이클로부텐-1-일), 사이클로펜텐일(1-사이클로펜텐-1-일), 사이클로헥센일(예: 1-사이클로헥센-1-일) 등을 들 수 있다.

'알콕시'라는 용어는 C_1-C_6 의 알콕시를 의미하고, 예로는 메톡시, 에톡시, n-프로콕시, i-프로콕시, n-부톡시 등을 들 수 있다.

'치환된- 또는 비치환된-아미노'라는 정의에 있어서 치환된 아미노의 예로는 단일- 또는 이-치환된 아미노(예: 메틸아미노, 에틸아미노, 디메틸아미노, 사이클로헥실아미노, 페닐아미노, 디페닐아미노) 또는 사이클릭 아미노(예: 피페리디노, 피페라디노 또는 모폴리노)를 들 수 있다.

'아실옥시'라는 용어는 상기 '아실'로부터 유도된 아실옥시를 의미하고, 예로는 아세틸옥시, 프로피온일옥시, 부틸릴옥시, 발레릴옥시 등을 들 수 있다.

'할로겐'이라는 용어는 불소, 염소, 브롬 및 요오드를 의미한다.

'알콕시카보닐'이라는 용어는 상기 '알콕시'로부터 유도된 알콕시카보닐 기를 의미하고, 예로는 메톡시카보닐, 에톡시카보닐, 페닐옥시카보닐 등을 들 수 있다.

'아르알킬옥시카보닐'이라는 용어는 상기 '아르알킬'로부터 유도된 아르알킬 옥시카보닐 기를 의미하고, 예로는 벤질옥시카보닐, 페닐옥시카보닐 등을 들 수 있다.

'아릴옥시카보닐'이라는 용어는 상기 '아릴'로부터 유도된 아릴옥시카보닐기를 의미하고, 예로는 페닐옥시

바탕 새선패트는 통사이 저지 바변 에를 돌리 용매로이 초초 크리미트크레피 제겨정원 드세 이세 정제화

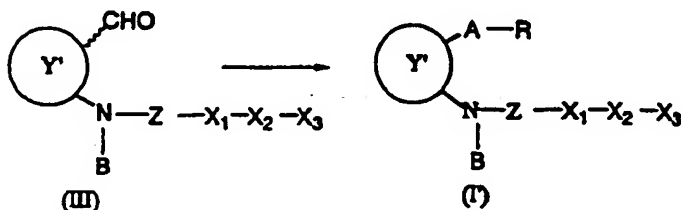
있다.

본 발명의 방법의 출발 물질인 화합물(II)의 구체적인 예는 다음과 같다. 3-아미노[2.2.1]비사이클릭 화합물의 예로는 7-(3-아미노비사이클로[2.2.1]헵트-2-일)-5-헵텐산, 7-(3-아미노비사이클로[2.2.1]헵트-2-일)-2,2-디메틸-5-헵텐산, 7(N-메틸-3-아미노비사이클로[2.2.1]헵트-2-일)-5-헵텐산, 6-(3-아미노비사이클로[2.2.1]헵트-2-일)-5-헵텐산을 들 수 있다. 2-아미노-6,6-디메틸[3.1.1]비사이클릭 화합물의 구체적인 예로는 7-(2-아미노-6,6-디메틸비사이클로[3.1.1]헵트-3-일)-5-헵텐산을 들 수 있다. 이러한 출발 물질에서, 헵텐산 쇄를 포화시켜 헵탄산쇄를 형성할 수도 있고, 쇄중에 헤테로 원자(들) 또는 헤테로기(들)(예: -O-, -S-, -NH- 또는 페닐렌)를 포함할 수도 있고, 옥소기로 치환될 수도 있다. 이러한 화합물의 예로는 7-(3-아미노비사이클로[2.2.1]헵트-2-일)헵탄산, 4-(2-(2-아미노비사이클로[3.3.1]헵트-3-일)에톡시)페닐아세트산, 7-(3-아미노비사이클로[2.2.1]헵트-2-일)-6-옥소-헵탄산을 들 수 있다. 이러한 출발 물질은 일본 특허 공보 제 93-79060 호 또는 제 91-23170호에 기술되어 있거나 또는 본원에 기술되어 있는 방법에 따라 제조할 수 있다.

상기 부분 구조($Z-X_1-X_2-X_3$)에 상응하는 설폰산(X_3-X_2-X

$1-SO_2OH$) 및 카복실산 ($X_3-X_2-X_1-COOH$)은 상기 X에 상응하는 치환체를 갖는 설폰산 또는 카복실산을 의미한다. 즉, 예로는 알칸-설폰산 또는 -카복실산, 알켄-설폰산 또는 -카복실산, 알킨-설폰산 또는 -카복실산, 사이클로알칸-설폰산 또는 -카복실산, 사이클로알칸-설폰산 또는 -카복실산, 아릴-설폰산 또는 -카복실산, 아르알킬옥시-설폰산 또는 -카복실산, 헤테로사이클릭 치환된-설폰산 또는 -카복실산, 헤테로아릴알킬-설폰산 또는 -카복실산 및 치환된-아미노-설폰산 또는 -카복실산을 들 수 있다. 설폰산 또는 카복실산은 각각 상기 치환체(들)를 가질 수도 있다. 이러한 설폰산 및 카복실산은 시판중이거나 또는 공지된 방법에 따라 공지된 화합물로부터 쉽게 합성할 수 있다. 반응하자마자, 설폰산 또는 카복실산은 필요한 경우, 상기 상응하는 반응성 유도체로 변환될 수 있다. 예를 들어, 산 할라이드가 필요한 경우, 문헌 [Shin-Jikken-Kagaku-Koza, vol. 14, 1787 페이지 (1978); Synthesis, 854-854(1986); Shin-Jikken-Kagaku-Koza, vol. 22, 115 페이지 (1992)]에서 기술하는 바와 같은 공지된 방법에 따라 화합물을 티온일 할라이드(예: 티온일 클로라이드), 인 할라이드(예: 삼염화인, 오염화인) 또는 옥살릴 할라이드(예: 옥살릴 클로라이드)와 반응시킨다. 다른 반응성 유도체 또한 공지된 방법으로 제조될 수 있다.

목적하는 화학식 I의 화합물중에서, 측쇄 A가 불포화 결합, 특히 이중 결합을 함유하는 화합물은 하기 일반식(III)의 알데하이드 유도체를 측쇄 A-R의 나머지 부분에 상응하는 알라이드 화합물과 비티히(Wittig) 반응 조건하에서 반응시켜 제조할 수 있다:



상기 식에서, A, B, R, X_1 , X_2 , X_3 , Y 및 Z는 상기 정의한 바와 같다.

출발 화합물(III)은 예를 들어 일본 특허 공개 공보 제 90-256650호에 기술된 방법에 따라 제조될 수 있다. 또한, 측쇄 A-R의 나머지 부분에 상응하는 알라이드 화합물은 트리페닐포스핀을 상응하는 할로겐화된 알칸산 또는 그의 에스테르 유도체, 에테르 유도체 또는 아마이드 유도체와 공지된 방법에 따라 염기의 존재하에서 반응시켜 합성할 수 있다.

목적하는 화학식 I의 화합물중에서, R이 COOH인 화합물은 바람직한 경우 상응하는 에스테르 유도체, 알콜 유도체, 에테르 유도체, 아마이드 유도체로 전환될 수 있다. 예를 들어, 에스테르 유도체는 카복실산을 중래의 방법으로 에스테르화하여 제조할 수 있다. 에스테르 유도체는 환원되는 경우, 알콜 유도체를 형성하고, 아마이드화되는 경우, 아마이드 유도체를 형성한다. 에테르 유도체는 알콜 유도체를 0-알킬화시켜 수득할 수 있다.

본 발명의 화학식 I의 화합물은 PGD₂ 수용체에 결합함으로써 시험관내에서 PGD₂에 대한 길항 효과를 나타내고, PGD₂의 과다한 생성으로 인한 비만 세포의 기능부전과 관련된 질병을 치료하기 위한 약제로서 유용하다. 예를 들어, 화학식 I의 화합물은 비만 세포의 기능 부전을 포함하는 질병의 치료용 약제로서 유용하다. 예를 들어, 화학식 I의 화합물은 전신성 비만 세포증 및 전신성 비만 세포 활성화의 장애 및 기관 수축, 천식, 알러지성 비염, 알러지성 결막염, 두드러기, 허혈성 재관류로 인한 손상 및 염증과 같은 질병을 치료하기 위한 약제로서 유용하다. 화학식 I의 화합물은 생체내에서 코의 폐색증에 대해 예방 효과를 보이고, 따라서 그를 치료하는 약제로서 특히 유용하다.

치료에 본 발명의 화학식 I의 화합물을 사용하는 경우, 화합물은 경구 및 비경구 투여를 위한 일반적인 제형으로 제형화될 수 있다. 본 발명의 화학식 I의 화합물을 함유하는 약학 조성물은 경구 및 비경구 투여를 위한 형태일 수 있다. 특히, 상기 화합물은 정제, 캡슐, 과립, 분말, 시럽 등과 같은 경구 투여용 제형; 및 정맥내, 근육내 또는 피하 주사용 주사 용액 또는 현탁액, 흡입제, 안약, 비강 점적, 좌제와 같은 비경구 투여용 제형; 또는 연고와 같은 경피 제형으로 제형화될 수 있다.

제형을 제조하는데 있어서, 당 분야의 일반적인 숙련자들에게 공지되어 있는 담체, 부형제, 용매 및 염기를 사용할 수도 있다. 정제의 경우, 보조 성분과 함께 활성 성분을 압착하거나 또는 배합함으로써 제조한다. 유용한 보조 성분의 예로는 결합제(예: 옥수수 전분), 충전제(예: 락토스, 미정질 셀룰로즈), 붕해제(예: 전분나트륨 글리콜레이트) 또는 윤활제(예: 마그네슘 스테아레이트)와 같은 약학적으로 허용가능한 부형제를 들 수 있다. 정제는 적절하게 피복될 수도 있다. 시럽, 용액 또는 현탁액과 같은 액체 제형의 경우, 현탁제(예: 메

메틸 (Z)-7-[(1S, 2R, 3R, 4R)-3-(2-디벤조푸릴)-설포닐아미노비사이클로[2.2.1]헵트-2-일]-5-헵테노에이트 (1a-1) (234 mg, 0.50 mmol)를 메탄올(6mL)/테트라하이드로퓨란(4mL)에 용해시켰다. 빙냉하에서 용액에 1N 칼륨 하이드록사이드 (1.50 mL, 1.50 mmol)를 첨가하였다. 반응 혼합물을 실온까지 가온한 다음, 16 시간 동안 반응시키고 농축시켜 용매를 제거하였다. 잔류물에 에틸 아세테이트(50 mL) 및 물 (10 mL)을 첨가하고, 그 다음 1N HCl (2.0 mL, 2.0 mmol)을 첨가하여 pH를 약 8로 조절한다. 유기층을 분리하고, 용기

IR (CHCl₃): 3266, 3026, 2952, 2874, 1708, 1465, 1443, 1423, 1319, 1267, 1245, 1153, 1121, 1104, 1072, 906 /cm.

¹H NMR(CDCl₃)δ: 0.93-1.94(14H,m), 2.12-2.19(1H,m), 2.26(2H,t, J=7.2Hz), 3.00-3.08(1H,m), 5.12-5.25(2H,m), 5.26(1H,d, J=6.6Hz), 7.38-7.45(1H,m), 7.51-7.70(3H,m), 7.87-8.13(2H,m), 8.54(1H, d, J=2.1Hz).

[α]_D²⁰ = +6.8° (CHCl₃, c=1.08 g, 23 °C).

(Z)-7-[(1S, 2R, 3R, 4R)-3-(2-디벤조푸릴)설포닐아미노비사이클로[2.2.1]헵트-2-일]-5-헵텐산(1a-2) (453 mg, 0.97 mmol)을 메탄올 (5ml)에 용해시켰다. 1N 나트륨 메톡사이드/메탄올 (1.034 N, 0.937 ml, 0.97 mmol)을 첨가한 후, 혼합물을 실온까지 가온하고 1시간 동안 반응시켰다. 증류에 의해 용매를 제거하여, 나트륨염(1a-3) (457 mg, 0.933 mmol)을 수득하였다.

수율: 96%, 비정질 분말.

원소 분석 (C₂₆H₂₈NO₅Na 0.6H₂O)

계산치 (%) : C, 62.41; H, 5.88; N, 2.80; S, 6.41; Na, 4.59

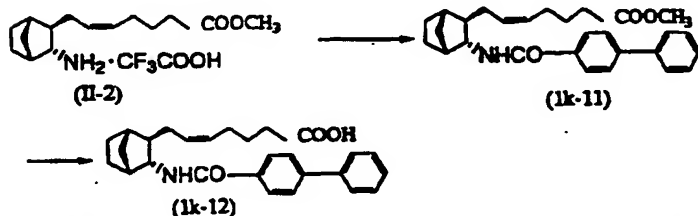
측정치 (%) : C, 62.45; H, 5.92; N, 2.99; S, 6.49; Na, 4.46

IR (KBr): 434, 3280, 3074, 3007, 2952, 2873, 1566, 1467, 1444, 1417, 1344, 1315, 1270, 1248, 1200, 1109, 1154, 1124, 1107, 1075, 1058, 895, 842, 818 /cm.

¹H NMR(CD₃OD)δ: 1.02-2.05(16H, m), 2.16-2.23(1H, m), 2.94-3.00(1H, m), 4.98-5.05(2H, m), 7.41-7.48(1H, m), 7.53-7.62(1H, m), 7.66(1H, d, J=8.4Hz), 7.77(1H, d, J=8.4Hz), 8.57(1H, d, J=2.1Hz).

[α]_D²⁰ = -15.2° (CH₃OH, c=1.07g, 22°C).

[실시예 2]



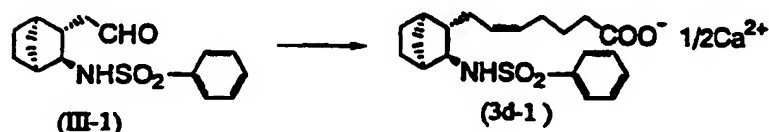
일본 특허 공고 공보 제 93-79060 호의 대조에 4에서 기술한 방법으로 제조한 메틸 (Z)-7-[(1S, 2R, 3R, 4R)-3-아미노비사이클로[2.2.1]헵트-2-일]-5-헵테노에이트 트리플루오로아세테이트(II-2) (232 mg, 0.636 mmol)를 메틸렌 클로라이드(5 ml)에 용해시켰다. 빙냉하에서 이 용액에 트리에틸아민(0.279 ml, 2.00 mmol) 및 4-비페닐카보닐 클로라이드를 첨가하고, 동일 온도에서 7시간동안 교반하였다. 반응 혼합물을 실리카 겔상에서 칼럼 크로마토그래피(에틸 아세테이트/n-헥산 (1:4))에 의해 정제하여 (Z)-7-[(1S, 2R, 3R, 4R)-3-(4-비페닐)카보닐아미노비사이클로[2.2.1]헵트-2-일]-5-헵테노에이트(1k-11) (221 mg, 0.512 mmol)를 수득하였다. 화합물(1K-11) (190 mg, 0.440 mmol)을 메탄올 (6ml)에 용해시켰다. 빙냉하에서 용액에 1N KOH(1.10 ml, 1.10 mmol)를 첨가하고 실온에서 15시간동안 교반하였다.

진공하에서 반응 혼합물을 농축시켰다. 물 (20 ml) 및 1N HCl(2 ml)을 첨가한 후, 잔류물을 에틸 아세테이트로 추출하였다. 유기층을 포화 염수로 세척하고, 무수 나트륨 설페이트로 건조시킨 후, 농축시켰다. 잔류물을 실리카 겔상에서 칼럼 크로마토그래피(0.3% 아세트산을 함유하는 에틸 아세테이트/헥산 (1:1))에 의해 정제하여 (Z)-7-[(1S, 2R, 3R, 4R)-3-(4-비페닐)카보닐아미노비사이클로[2.2.1]헵트-2-일]-5-헵텐산(1k-12) (172 mg, 0.412 mmol)을 수득하였다.

수율: 94%.

또한, 하기의 화합물을 하기의 방법으로 제조할 수 있다.

[실시예 3]



질소 분위기하의 실온에서 4-카복시부틸트리페닐포스포늄 브로마이드(14.8 g 33.3 mmol) 및 테트라하이드로푸란(80 ml)의 현탁액에 칼륨 3급-부티레이트 (7.55g, 67.3 mmol)를 첨가하였다. 실온에서 1시간 동안 교반한 후, 혼합물을 -20℃로 냉각시키고, 테트라하이드로푸란 (20ml)내 N-[(1S, 2S, 3S, 4R)-3-포르밀에틸비사이클로[2.2.1]헵트-2-일]벤젠설포나미드(III-1) (일본 특허 공개 공보 제 90-256650 호, 대조예 2) (3.25 g, 11.1 mmol)를 천천히 첨가하였다. -20℃에서 약 1시간 동안 교반한 후, 냉용을 제거하고, 1시간 동안 추가로 혼합물을 교반하였다. 반응 용액에 2N HCl를 첨가하고, 혼합물을 에틸 아세테이트로 추출하고, 물 및 염수로 세척한 후 농축시켰다. 물루엔 및 1N 나트륨 하이드록사이드를 생성된 조질의 생성물에 첨가한 후 수성층을 분리하였다. 유기층을 물로 다시 세척하고, 세척액을 앞서 얻은 수성층과 합쳤다. 2N HCl를 첨가한 후, 수용액을 에틸 아세테이트로 추출하였다. 추출물을 물 및 염수로 세척하고, 나트륨 설페이트로 건조시킨 후 농축시켰다. 잔류물을 실리카 겔상에서 컬럼 크로마토그래피에 의해 정제하여 칼슘 (Z)-7-[(1R, 2S, 3S, 4S)-3-페닐설포닐아미노비사이클로[2.2.1] 헵트-2-일]-5-헵테노에이트(1d-1) (3.29 g)를 수득하였다.

수율 : 79%, mp : 62℃.

원소 분석 : (C₂₀H₂₇NO₄S)

계산치 (%) : C, 63.63; H, 7.21; N, 3.71; S, 8.49

측정치 (%) : C, 63.56; H, 7.21; N, 3.83; S, 8.43

[α]_D²⁰ + 5.3 ± 0.5° (CHCl₃, c=1.003 g, 22℃)

[α]_D²⁰ + 27.1 ± 0.7° (MeOH, c=1.015 g, 24℃)

IR(뉴클) 3282, 3260, 3300, 2400, 1708, 1268, 1248, 1202, 1162, 1153, 1095, 1076/cm.

¹H NMR δ 0.88-2.10(m, 14H), 2.14(br s, 1H), 2.34(t, J=7.2Hz, 2H),

2.95-3.07(m, 1H), 5.13-5.35(m, 3H), 7.45-7.64(m, 3H), 7.85-7.94(m,

2H), 9.52(br s, 1H).

상기 실시예에서 기술한 방법에 따라 제조된 화합물을 하기 표에 제시하였다.

표 1a

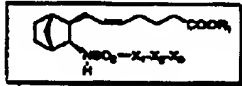
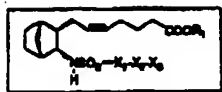
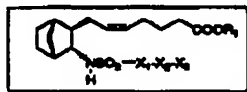
		
No.	R ₁	X ₁ -X ₂ -X ₃
1a-1	CH ₃	
1a-2	H	
1a-3	Na	
1a-4	CH ₃	
1a-5	H	
1a-6	CH ₃	
1a-7	H	
1a-8	CH ₃	
1a-9	H	
1a-10	CH ₃	
1a-11	H	
1a-12	CH ₃	
1a-13	H	
1a-14	CH ₃	
1a-15	H	
1a-16	CH ₃	
1a-17	H	
1a-18	CH ₃	
1a-19	H	
1a-20	CH ₃	
1a-21	H	
1a-22	H	
1a-23	H	

표 1a (계속)



No.	R ₁	X ₁ -X ₂ -X ₃
1a-24	CH ₃	
1a-25	H	
1a-26	Na	
1a-27	CH ₃	
1a-28	H	
1a-29	Na	
1a-30	CH ₃	
1a-31	H	
1a-32	CH ₃	
1a-33	H	
1a-34	CH ₃	
1a-35	CH ₃	
1a-36	H	
1a-37	CH ₃	
1a-38	H	
1a-39	CH ₃	
1a-40	H	
1a-41	H	
1a-42	CH ₃	
1a-43	H	
1a-44	CH ₃	
1a-45	H	

표 1a (계속)



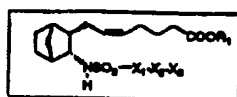
No.	R ₁	X ₁ -X ₂ -X ₃
1a-46	CH ₃	
1a-47	H	
1a-48	Na	
1a-49	CH ₃	
1a-50	H	
1a-51	CH ₃	
1a-52	H	
1a-53	CH ₃	
1a-54	H	
1a-55	CH ₃	
1a-56	H	
1a-57	CH ₃	
1a-58	H	
1a-59	CH ₃	
1a-60	H	
1a-61	CH ₃	
1a-62	H	
1a-63	CH ₃	
1a-64	H	
1a-65	CH ₃	
1a-66	H	
1a-67	CH ₃	
1a-68	H	

표 1a (계속)



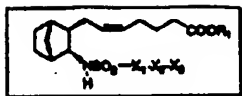
No.	R ₁	X ₁ -X ₂ -X ₃
1a-69	CH ₃	
1a-70	H	
1a-71	CH ₃	
1a-72	H	
1a-73	CH ₃	
1a-74	H	
1a-75	CH ₃	
1a-76	H	
1a-77	CH ₃	
1a-78	H	
1a-79	H	
1a-80	CH ₃	
1a-81	H	
1a-82	CH ₃	
1a-83	H	
1a-84	H	
1a-85	H	
1a-86	H	
1a-87	H	

표 1a (계속)



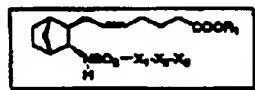
No.	R ₁	X ₁ -X ₂ -X ₃
1a-88	CH ₃	
1a-89	H	
1a-90	CH ₃	
1a-91	H	
1a-92	CH ₃	
1a-93	H	
1a-94	H	
1a-95	H	
1a-96	H	
1a-97	H	
1a-98	H	
1a-99	Na	

표 1a (계속)



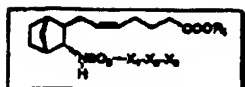
No.	R ₁	X ₁ -X ₂ -X ₃
1a-189	CH ₃	
1a-191	H	
1a-192	CH ₃	
1a-193	CH ₃	
1a-194	H	
1a-195	CH ₃	
1a-196	H	
1a-197	CH ₃	
1a-198	H	
1a-199	CH ₃	
1a-200	H	
1a-201	CH ₃	
1a-202	H	
1a-203	CH ₃	
1a-204	H	
1a-205	CH ₃	
1a-206	H	
1a-207	CH ₃	
1a-208	H	
1a-209	CH ₃	
1a-210	H	
1a-211	CH ₃	
1a-212	H	
1a-213	CH ₃	
1a-214	H	
1a-215	CH ₃	

표 1a (계속)



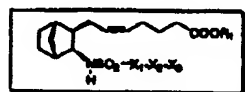
No.	R ₁	X ₁ -X ₂ -X ₃
1a-216	CH ₃	
1a-217	H	
1a-218	CH ₃	
1a-219	H	
1a-220	CH ₃	
1a-221	H	
1a-222	CH ₃	
1a-223	H	
1a-224	CH ₃	
1a-225	H	
1a-226	CH ₃	
1a-227	H	
1a-228	CH ₃	
1a-229	H	
1a-230	CH ₃	
1a-231	H	
1a-232	CH ₃	
1a-233	H	
1a-234	CH ₃	
1a-235	H	
1a-236	CH ₃	
1a-237	H	
1a-238	CH ₃	
1a-239	H	
1a-240	CH ₃	
1a-241	H	

표 1a (계속)



No.	R ₁	X ₁ -X ₂ -X ₃
1a-141	CH ₃	
1a-142	H	
1a-143	H	
1a-144	H	
1a-145	H	
1a-146	H	
1a-147	H	
1a-148	H	
1a-149	H	
1a-150	H	
1a-151	H	

표 1a (계속)



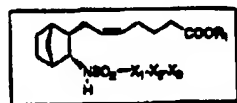
No.	R ₁	X ₁ -X ₂ -X ₃
1a-152	H	
1a-153	H	
1a-154	H	
1a-155	H	
1a-156	H	
1a-157	H	
1a-158	H	
1a-159	H	
1a-160	H	

표 1a (계속)



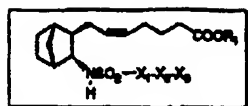
No.	R ₁	X ₁ -X ₂ -X ₃
1a-161	H	
1a-162	H	
1a-163	H	
1a-164	H	
1a-165	H	
1a-166	H	
1a-167	H	
1a-168	H	
1a-169	H	
1a-170	H	
1a-171	CH ₃	
1a-172	H	

표 1a (계속)



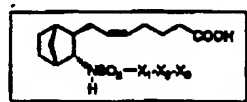
No.	R ₁	X ₁ -X ₂ -X ₃
1a-173	H	
1a-174	H	
1a-175	CH ₃	
1a-176	H	
1a-177	CH ₃	
1a-178	H	
1a-179	CH ₃	
1a-180	H	
1a-181	H	
1a-182	CH ₃	
1a-183	H	

표 1a (계속)



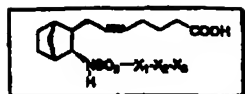
No.	R ₁	X ₁ -X ₂ -X ₃
1a-184	H	
1a-185	H	
1a-186	CH ₃	
1a-187	H	
1a-188	CH ₃	
1a-189	H	
1a-190	CH ₃	
1a-191	H	
1a-192	CH ₃	
1a-193	H	

표 1a (계속)



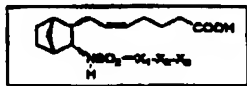
No.	X ₁ -X ₂ -X ₃
1a-194	
1a-195	
1a-196	
1a-197	
1a-198	
1a-199	
1a-200	
1a-201	
1a-202	
1a-203	

표 1a (계속)



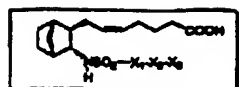
No.	$X_1-X_2-X_3$
1a-304	
1a-305	
1a-306	
1a-307	
1a-308	
1a-309	
1a-310	
1a-311	
1a-312	
1a-313	

표 1a (계속)



No.	$X_1-X_2-X_3$
1a-314	
1a-315	
1a-316	
1a-317	
1a-318	
1a-319	
1a-320	
1a-321	
1a-322	
1a-323	

표 1a (계속)



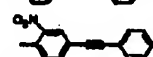
No.

X₁-X₂-X₃

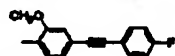
1a-224



1a-225



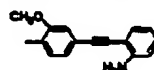
1a-226



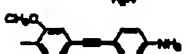
1a-227



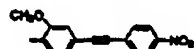
1a-228



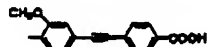
1a-229



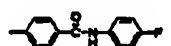
1a-230



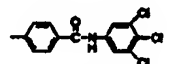
1a-231



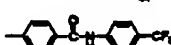
1a-232



1a-233



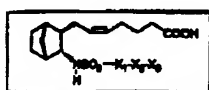
1a-234



1a-235



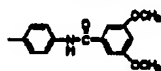
표 1a (계속)



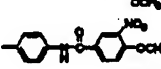
No.

X₁-X₂-X₃

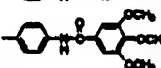
1a-236



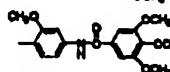
1a-237



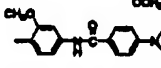
1a-238



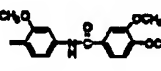
1a-239



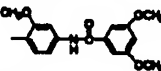
1a-240



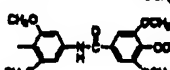
1a-241



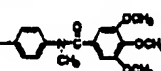
1a-242



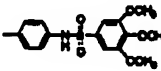
1a-243



1a-244



1a-245



1a-246

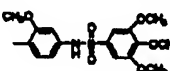
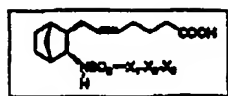


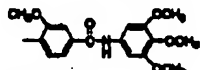
표 1a (계속)



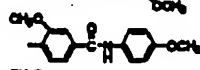
No.

X₁-X₂-X₃

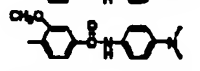
1a-347



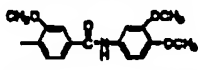
1a-348



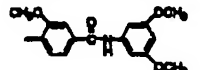
1a-349



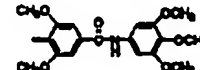
1a-350



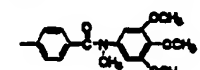
1a-351



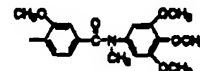
1a-352



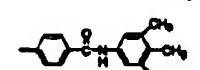
1a-353



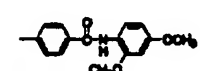
1a-354



1a-355



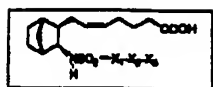
1a-356



1a-357

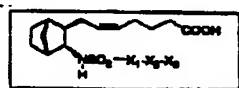


표 1a (계속)



No.	X ₁ -X ₂ -X ₃
1a-348	
1a-349	
1a-350	
1a-351	
1a-352	
1a-353	
1a-354	
1a-355	
1a-356	
1a-357	
1a-358	
1a-359	
1a-370	
1a-371	

표 1a (계속)



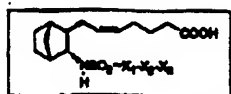
No.	X ₁ -X ₂ -X ₃
1a-372	
1a-373	
1a-374	
1a-375	
1a-376	
1a-377	
1a-378	
1a-379	
1a-380	
1a-381	
1a-382	
1a-383	

표 1a (계속)



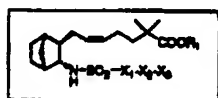
No.	X ₁ X ₂ X ₃ X ₄ X ₅
1a-284	
1a-285	
1a-286	
1a-287	
1a-288	
1a-289	
1a-290	
1a-291	
1a-292	
1a-293	
1a-294	

표 1a (계속)



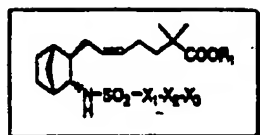
No.	$X_1-X_2-X_3$
1a-295	
1a-296	
1a-297	
1a-298	
1a-299	
1a-300	
1a-301	
1a-302	
1a-303	
1a-304	
1a-305	

表 1b



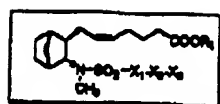
No.	R_1	$X_1-X_2-X_3$
1b-1	CH_3	
1b-2	CH_3	
1b-3	H	
1b-4	H	
1b-5	H	
1b-6	H	
1b-7	H	
1b-8	H	
1b-9	H	
1b-10	H	

표 1b (계속)



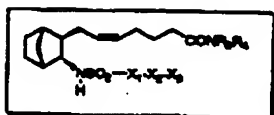
No.	R ₁	X ₁ -X ₂ -X ₃
1b-11	H	
1b-12	H	
1b-13	H	
1b-14	H	
1b-15	H	

표 1c



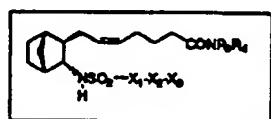
No.	R_1	$X_1-X_2-X_3$
1a-1	CH_3	
1a-2	CH_3	
1a-3	H	
1a-4	H	
1a-5	H	
1a-6	H	
1a-7	H	
1a-8	H	
1a-9	H	
1a-10	H	
1a-11	H	
1a-12	H	

II 1d



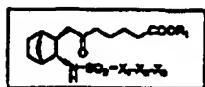
No.	$R_2 - R_1$	$X_1-X_2-X_3$
14-1	H SO_2CH_3	
14-2	H H	
14-3	H OH	
14-4	H SO_2CH_3	
14-5	H SO_2CH_3	
14-6	H SO_2CH_3	
14-7	H SO_2CH_3	
14-8	H SO_2CH_3	
14-9	H SO_2CH_3	
14-10	H SO_2CH_3	

표 1d (계속)



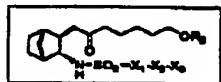
No.	$R_2 - R_1$	$X_1-X_2-X_3$
14-11	H SO_2CH_3	
14-12	H SO_2CH_3	
14-13	H SO_2CH_3	
14-14	H SO_2CH_3	
14-15	H SO_2CH_3	

표 1e



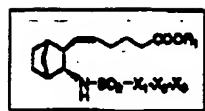
No.	R ₂	X ₁ -X ₂ -X ₃
1a-1	H	
1a-2	H	
1a-3	H	
1a-4	H	
1a-5	H	
1a-6	H	
1a-7	H	
1a-8	H	
1a-9	H	
1a-10	H	

II 1f



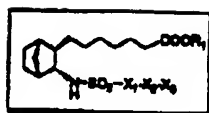
No.	R ₂	X ₁ -X ₂ -X ₃
1f-1	H	
1f-2	H	
1f-3	H	
1f-4	H	
1f-5	H	
1f-6	H	
1f-7	H	
1f-8	H	
1f-9	H	
1f-10	H	

II 1g



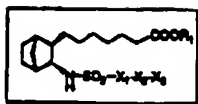
No.	R ₁	X ₁ -X ₂ -X ₃
1g-1	H	
1g-2	H	
1g-3	H	
1g-4	H	
1g-5	H	
1g-6	H	
1g-7	H	
1g-8	H	
1g-9	H	
1g-10	H	
1g-11	H	

표 1h



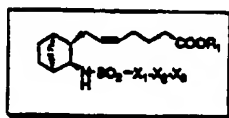
No.	R_1	$X_1-X_2-X_3$
1b-1	H	
1b-2	H	
1b-3	H	
1b-4	H	
1b-5	H	
1b-6	H	
1b-7	H	
1b-8	H	
1b-9	H	
1b-10	H	

표 1i



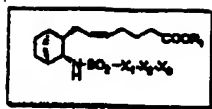
No.	R ₁	X ₁ -X ₂ -X ₃
1b-1	H	
1b-2	H	
1b-3	H	
1b-4	H	
1b-5	H	
1b-6	H	
1b-7	H	
1b-8	H	
1b-9	H	
1b-10	H	

표 1j



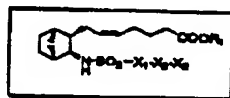
No.	R ₁	X ₁ -X ₂ -X ₃
1j-1	CH ₃	
1j-2	H	
1j-3	Na	
1j-4	H	
1j-5	CH ₃	
1j-6	CH ₃	
1j-7	H	
1j-8	CH ₃	
1j-9	CH ₃	
1j-10	H	
1j-11	CH ₃	
1j-12	H	
1j-13	CH ₃	
1j-14	H	
1j-15	CH ₃	
1j-16	H	

표 1j(계속)



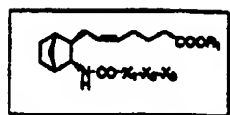
No.	R ₁	X ₁ -X ₂ -X ₃
1j-17	H	
1j-18	CH ₃	
1j-19	H	
1j-20	CH ₃	
1j-21	H	
1j-22	H	
1j-23	CH ₃	
1j-24	H	
1j-25	CH ₃	
1j-26	H	
1j-27	H	
1j-28	CH ₃	
1j-29	H	

표 1j(계속)



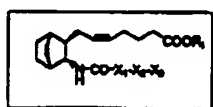
No.	R ₁	X ₁ -X ₂ -X ₃
1j-30	H	
1j-31	H	
1j-32	H	
1j-33	H	
1j-34	H	
1j-35	H	
1j-36	H	
1j-37	H	
1j-38	H	

표 1k



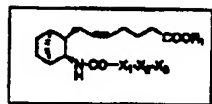
No.	R ₁	X ₁ -X ₂ -X ₃
1b-1	H	
1b-2	CH ₃	
1b-3	H	
1b-4	H	
1b-5	H	
1b-6	H	
1b-7	H	
1b-8	H	
1b-9	H	
1b-10	H	
1b-11	CH ₃	
1b-12	H	

표 1k (계속)



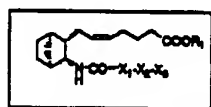
No.	R ₁	X ₁ -X ₂ -X ₃
1b-13	H	
1b-14	H	
1b-15	H	
1b-16	H	
1b-17	H	
1b-18	H	
1b-19	H	
1b-20	H	

표 1m



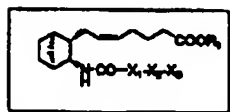
No.	R ₁	X ₁ -X ₂ -X ₃
1m-1 1m-2	CH ₃ H	
1m-3 1m-4	CH ₃ H	
1m-5 1m-6	CH ₃ H	
1m-7 1m-8	CH ₃ H	
1m-9 1m-10	CH ₃ H	
1m-11 1m-12	CH ₃ H	
1m-13 1m-14	CH ₃ H	
1m-15 1m-16	CH ₃ H	
1m-17 1m-18	CH ₃ H	

표 1m (계속)



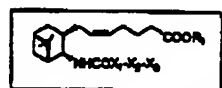
No.	R ₁	X ₁ -X ₂ -X ₃
1m-19 1m-20	CH ₃ H	
1m-21	H	
1m-22	H	
1m-23 1m-24	CH ₃ H	
1m-25 1m-26	CH ₃ H	
1m-27 1m-28	CH ₃ H	
1m-29 1m-30	CH ₃ H	
1m-31	H	
1m-32	H	
1m-33	H	

표 1m (계속)



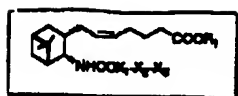
No.	R ₁	X ₁ -X ₅ -X ₆
1m-34	H	
1m-35	H	
1m-36	H	
1m-37	H	
1m-38	H	
1m-39	H	
1m-40	H	

표 2a



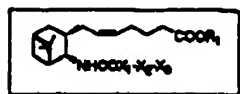
No.	R ₁	X ₁ -X ₅ -X ₆
2a-1	CH ₃	
2a-2	H	
2a-3	CH ₃	
2a-4	H	
2a-5	Me	
2a-6	CH ₃	
2a-7	H	
2a-8	CH ₃	
2a-9	H	
2a-10	CH ₃	
2a-11	H	
2a-12	CH ₃	
2a-13	H	
2a-14	CH ₃	
2a-15	H	
2a-16	CH ₃	
2a-17	H	
2a-18	CH ₃	
2a-19	H	
2a-20	CH ₃	
2a-21	H	
2a-22	Me	
2a-23	CH ₃	
2a-24	H	

표 2a (계속)



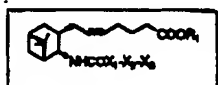
No.	R ₁	X ₁ -X ₂ -X ₃
2a-35	CH ₃	
2a-36	H	
2a-37	CH ₃	
2a-38	H	
2a-39	CH ₃	
2a-40	H	
2a-41	CH ₃	
2a-42	H	
2a-43	CH ₃	
2a-44	H	
2a-45	CH ₃	
2a-46	H	
2a-47	CH ₃	
2a-48	H	

표 2a (계속)



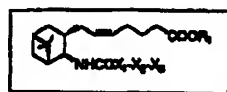
No.	R_1	$X_1-X_2-X_3$
2a-48	CH_3	
2a-49	H	
2a-50	CH_3	
2a-51	H	
2a-52	CH_3	
2a-53	H	
2a-54	CH_3	
2a-55	H	
2a-56	CH_3	
2a-57	H	
2a-58	CH_3	
2a-59	H	
2a-60	CH_3	
2a-61	H	
2a-62	CH_3	
2a-63	H	
2a-64	CH_3	
2a-65	H	
2a-66	CH_3	
2a-67	H	

표 2a (계속)



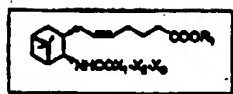
No.	R_1	$X_1-X_2-X_3$
2a-68	CH_3	
2a-69	H	
2a-70	CH_3	
2a-71	H	
2a-72	CH_3	
2a-73	H	
2a-74	CH_3	
2a-75	H	
2a-76	CH_3	
2a-77	H	
2a-78	CH_3	
2a-79	H	
2a-80	CH_3	
2a-81	H	
2a-82	CH_3	
2a-83	H	
2a-84	CH_3	
2a-85	H	
2a-86	CH_3	
2a-87	H	

표 2a (계속)



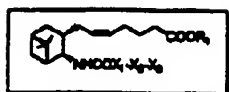
No.	R ₁	X ₁ -X ₂ -X ₃
2a-88	CH ₃	
2a-89	H	
2a-90	CH ₃	
2a-91	H	
2a-92	CH ₃	
2a-93	H	
2a-94	CH ₃	
2a-95	H	
2a-96	Na	
2a-97	Ca ¹⁺	
2a-98	CH ₃	
2a-99	H	
2a-100	CH ₃	
2a-101	H	
2a-102	CH ₃	
2a-103	H	
2a-104	CH ₃	
2a-105	H	
2a-106	CH ₃	
2a-107	H	
2a-108	CH ₃	
2a-109	H	
2a-110	Na	
2a-111	CH ₃	
2a-112	H	

표 2a (계속)



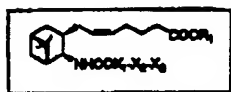
No.	- R ₁	X ₁ -X ₂ -X ₃
2a-113	CH ₃	
2a-114	H	
2a-115	CH ₃	
2a-116	H	
2a-117	CH ₃	
2a-118	H	
2a-119	H	
2a-120	H	
2a-121	H	
2a-122	H	
2a-123	H	
2a-124	H	
2a-125	H	

표 2a (계속)



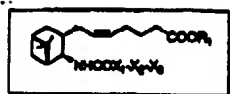
No.	R ₁	X ₁ -X ₂ -X ₃
2a-126	H	
2a-127	H	
2a-128	H	
2a-129	H	
2a-130	H	
2a-131	H	
2a-132	H	
2a-133	H	
2a-134	H	
2a-135	H	
2a-136	H	

표 2a (계속)



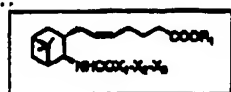
No.	R ₁	X ₁ X ₂ X ₃
2a-137	H	
2a-138	H	
2a-139	H	
2a-140	H	
2a-141	H	
2a-142	H	
2a-143	H	
2a-144	H	
2a-145	H	
2a-146	H	
2a-147	H	

표 2a (계속)



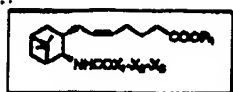
No.	-R_1	$\text{X}_1\text{-X}_2\text{-X}_3$
2a-148	H	
2a-149	H	
2a-150	H	
2a-151	H	
2a-152	H	
2a-153	H	
2a-154	H	
2a-155	H	
2a-156	H	
2a-157	H	
2a-158	H	
2a-159	H	

표 2a (계속)



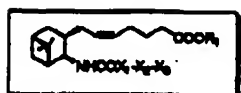
No.	- R ₁	X ₁ -X ₂ -X ₃
2a-160	H	
2a-161	H	
2a-162	H	
2a-163	H	
2a-164	H	
2a-165	H	
2a-166	H	
2a-167	H	
2a-168	H	
2a-169	H	
2a-170	H	

표 2a (계속)



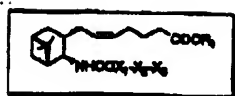
No.	- R ₁	X ₁ -X ₂ -X ₃
2a-171	H	
2a-172	H	
2a-173	H	
2a-174	H	
2a-175	H	
2a-176	H	
2a-177	H	
2a-178	H	
2a-179	H	
2a-180	H	
2a-181	H	
2a-182	H	

표 2a (계속)



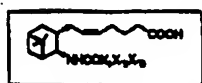
No.	- R ₁	X ₁ -X ₂ -X ₃
2a-183	H	
2a-184	H	
2a-185	H	
2a-186	H	
2a-187	H	
2a-188	H	
2a-189	H	
2a-190	H	
2a-191	H	
2a-192	H	
2a-193	H	

표 2a (계속)



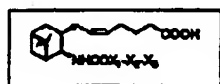
No.	R ₁	X ₁ -X ₂ -X ₃
2a-194	H	
2a-195	H	
2a-196	H	
2a-197	H	
2a-198	H	
2a-199	H	
2a-200	H	
2a-201	H	
2a-202	H	
2a-203	H	

표 2a (계속)



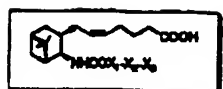
No.	$X_1-X_2-X_3$
2a-304	
2a-305	
2a-306	
2a-307	
2a-308	
2a-309	
2a-310	
2a-311	
2a-312	
2a-313	

표 2a (계속)



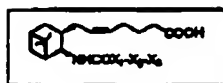
No.	$X_1-X_2-X_3$
2a-314	
2a-315	
2a-316	
2a-317	
2a-318	
2a-319	
2a-320	
2a-321	
2a-322	
2a-323	

표 2a (계속)



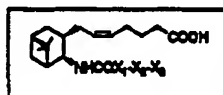
No.	X_1, X_2, X_3
2a-224	
2a-225	
2a-226	
2a-227	
2a-228	
2a-229	
2a-230	
2a-231	
2a-232	
2a-233	

표 2a (계속)



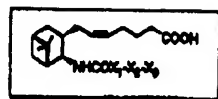
No.	$X_1-X_2-X_3$
2a-334	
2a-335	
2a-336	
2a-337	
2a-338	
2a-339	
2a-340	
2a-341	
2a-342	
2a-343	

표 2a (계속)



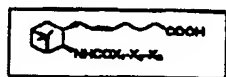
No.	$X_1-X_2-X_3$
2a-344	
2a-345	
2a-346	
2a-347	
2a-348	
2a-349	
2a-350	
2a-351	

표 2a (계속)



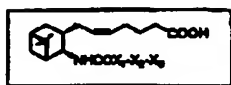
No.	X ₁ -X ₂ -X ₃
2a-252	
2a-253	
2a-254	
2a-255	
2a-256	
2a-257	

표 2a (계속)



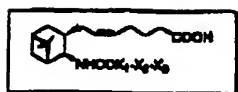
No.	X ₁ -X ₂ -X ₃
2a-258	
2a-259	
2a-260	
2a-261	
2a-262	
2a-263	
2a-264	
2a-265	
2a-266	
2a-267	

표 2a (계속)



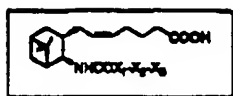
No.	X ₁ -X ₂ -X ₃
2a-368	
2a-369	
2a-370	
2a-371	
2a-372	
2a-373	
2a-374	
2a-375	
2a-376	
2a-377	

표 2a (계속)



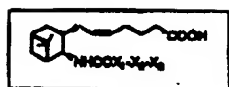
No.	X ₁ -X ₂ -X ₃
2a-278	
2a-279	
2a-280	
2a-281	
2a-282	
2a-283	
2a-284	
2a-285	
2a-286	
2a-287	

표 2a (계속)



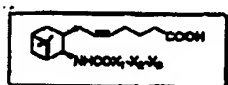
No.	X ₁ -X ₂ -X ₃
2a-288	
2a-289	
2a-290	
2a-291	
2a-292	
2a-293	
2a-294	
2a-295	
2a-296	

표 2a (계속)



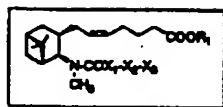
No.	X ₁ -X ₂ -X ₃
2a-377	
2a-378	
2a-379	
2a-380	
2a-381	
2a-382	
2a-383	
2a-384	
2a-385	
2a-386	

표 2a (계속)



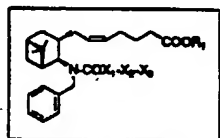
No.	X ₁ -X ₂ -X ₃
2a-387	
2a-388	
2a-389	
2a-390	
2a-391	
2a-392	
2a-393	
2a-394	
2a-395	

II 2b



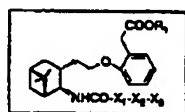
No.	R ₁	X ₁ -X ₂ -X ₃
2b-1	H	
2b-2	H	

II 2c



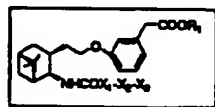
No.	R ₁	X ₁ -X ₂ -X ₃
2c-1	H	
2c-2	H	
2c-3	H	

II 2d



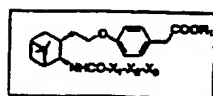
No.	R ₁	X ₁ -X ₂ -X ₃
2d-1	H	
2d-2	H	
2d-3	H	

II 2e



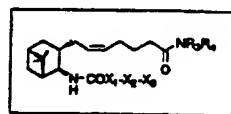
No.	R ₁	X ₁ -X ₂ -X ₃
2e-1	H	
2e-2	H	
2e-3	H	

II 2f



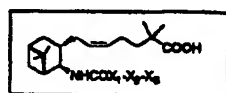
No.	R_1	$X_1-X_2-X_3$
2f-1	H	
2f-2	H	
2f-3	H	

II 2g



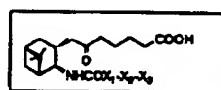
No.	R_2	R_3	$X_1-X_2-X_3$
2g-1	H	SO_2CH_3	

II 2h



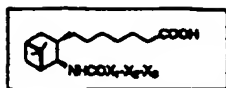
No.	$X_1-X_2-X_3$
2h-1	
2h-2	
2h-3	
2h-4	
2h-5	
2h-6	

II 2i



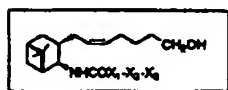
No.	$X_1-X_2-X_3$
2i-1	
2i-2	
2i-3	
2i-4	
2i-5	
2i-6	

II 2j



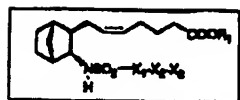
No.	$X_1-X_2-X_3$
2j-1	
2j-2	
2j-3	
2j-4	
2j-5	
2j-6	

II 2k



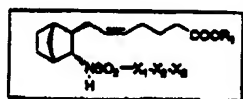
No.	$X_1-X_2-X_3$
2k-1	
2k-2	
2k-3	
2k-4	
2k-5	
2k-6	

II 3a



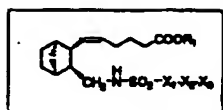
No.	R ₁	X ₁ -X ₂ -X ₃
3a-1	CH ₃	
3a-2	H	
3a-3	CH ₃	
3a-4	H	
3a-5	H ₃ C(CH ₂) ₁₀ OH	
3a-6	Nb	
3a-7	Li/Cs	
3a-8	H	
3a-9	H	
3a-10	CH ₃	
3a-11	H	
3a-12	CH ₃	
3a-13	H	
3a-14	CH ₃	
3a-15	CH ₃	
3a-16	H	
3a-17	CH ₃	
3a-18	H	

표 3a (계속)



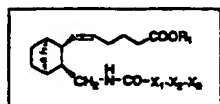
No.	R ₁	X ₁ -X ₂ -X ₃
3a-19	CH ₃	
3a-20	H	
3a-21	CH ₃	
3a-22	H	
3a-23	CH ₃	
3a-24	H	
3a-25	H	
3a-26	CH ₃	
3a-27	H	
3a-28	CH ₃	
3a-29	H	
3a-30	CH ₃	
3a-31	CH ₃	
3a-32	H	
3a-33	Nb	
3a-34	H	
3a-35	Nb	

표 3b



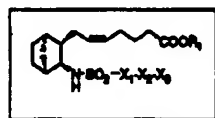
No.	R ₁	X ₁ -X ₂ -X ₃
3b-1	CH ₃	
3b-2	H	
3b-3	H	
3b-4	H	

표 3c



No.	R ₁	X ₁ -X ₂ -X ₃
3c-1	H	

표 3d



No.	R ₁	X ₁ -X ₂ -X ₃
3d-1	1/2 C ₆	
3d-2	Na	
3d-3	Na	
3d-4	Na	
3d-5	CH ₃	
3d-6	H	
3d-7	CH ₃	
3d-8	H	
3d-9	Na	
3d-10	CH ₃	
3d-11	H	
3d-12	Na	
3d-13	1/2 C ₆	
3d-14	H	
3d-15	Na	

표 3d (계속)

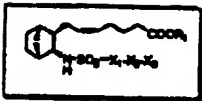










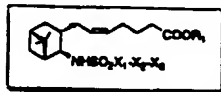

<div>  </div>		
No.	R ₁	X ₁ -X ₂ -X ₃
34-26	H	
34-27	H	
34-28	H	
34-29	CH ₃	
34-30	H	
34-21	CH ₃	
34-22	H	
34-23	H	
34-34	H	
34-25	H	
34-26	H	
34-27	H	
34-28	H	
34-29	H	

표 3e

<div>  </div>		
No.	R ₁	X ₁ -X ₂ -X ₃
3e-1	1/2Ca	

상기 화합물들의 물리화학적 특성은 하기와 같다. 화합물의 번호는 상기 표들의 번호에 상응한다.

No.1a - 4

$[\alpha]_D^{25} = -11.5^\circ$ ($\text{CHCl}_3, c=1.01, 25.5^\circ\text{C}$).

No.1a - 5

$[\alpha]_D^{25} = -10.0^\circ$ ($\text{CHCl}_3, c=1.01, 25.0^\circ\text{C}$).

No.1a - 6

CDCl_3 , 300MHz

0.93-1.96(14H,m), 2.20-2.26(3H,m), 3.03(1H,m), 3.67(3H,s), 4.99(1H,d,J=6.6Hz), 5.10-5.24(2H,m), 7.37-7.51(3H,m), 7.54-7.64(3H,m), 7.76-7.83(2H,m), 8.11(1H,m).

IR (CHCl_3): 3384, 3278, 3025, 2952, 2874, 1727, 1436, 1411, 1324, 1155, 1097 cm^{-1} .

$[\alpha]_D^{25} = -9.0^\circ$ ($\text{CHCl}_3, c=1.04, 22.0^\circ\text{C}$).

No.1a - 7

CDCl_3 , 300MHz

0.93-2.00(14H,m), 2.18(1H,m), 2.28(2H,t,J=7.2Hz), 3.04(1H,m), 5.15-5.25(2H,m), 5.28(1H,d,J=6.9Hz), 7.36-7.50(3H,m), 7.54-7.63(3H,m), 7.76-7.89(2H,m), 8.12(1H,m).

IR (CHCl_3): 3368, 3028, 2952, 2872, 1708, 1452, 1410, 1324, 1155, 1097 cm^{-1} .

$[\alpha]_D^{25} = 9.1^\circ$ ($\text{CHCl}_3, c=1.01, 24.0^\circ\text{C}$).

No.1a - 8

CDCl_3 , 300MHz

0.94-1.22(14H,m), 2.21-

2.29(3H,m), 3.05(1H,m), 3.67(3H,s), 4.92(1H,d,J=6.3Hz), 5.14-5.30(2H,m), 7.70-7.78(6H,m), 7.96-8.01(3H,m).

IR (CHCl_3): 3376, 3272, 3018, 2946, 2868, 1727, 1618, 1435, 1388, 1324, 1162, 1180, 1069 cm^{-1} .

$[\alpha]_D^{25} = +1.6^\circ$ ($\text{CHCl}_3, c=1.01, 24.0^\circ\text{C}$). mp. 117-119 $^\circ\text{C}$.

No.1a - 9

CDCl_3 , 300MHz

0.95-2.08(14H,m), 2.19(1H,m), 2.32(2H,t,J=7.2Hz), 3.06(1H,m), 5.20-5.30(2H,m), 5.34(1H,d,J=6.6Hz), 7.69-7.78(6H,m), 7.96-8.08(2H,m).

IR (CHCl_3): 3260, 3020, 2950, 2868, 1708, 1389, 1324, 1162, 1130, 1069 cm^{-1} .

$[\alpha]_D^{25} = +13.3^\circ$ ($\text{CHCl}_3, c=1.05, 24.0^\circ\text{C}$).

mp. 118-120 $^\circ\text{C}$

No.1a - 10

CDCl_3 , 300MHz

0.96-1.98(14H,m), 2.15-2.32(3H,m), 3.04(1H,m), 3.66(3H,s), 5.12-5.26(3H,m), 7.67-7.78(4H,m), 7.93-8.07(4H,m).

IR (CHCl_3): 3276, 3018, 2946, 2868, 1726, 1595, 1435, 1341, 1162, 1095 cm^{-1} .

$[\alpha]_D^{25} = -1.5^\circ$ ($\text{CHCl}_3, c=1.01, 25.0^\circ\text{C}$).

mp. 188-189 $^\circ\text{C}$.

No.1a - 11

CD_3OD 300MHz

1.05-1.98(14H,m), 2.13-2.22(3H,m), 2.97(1H,m), 5.09-5.22(2H,m), 7.85-7.92(4H,m), 7.95-8.05(4H,m).

IR (KBr): 3385, 3281, 3069, 3003, 2954, 2872, 1708, 1596, 1428, 1413, 1378, 1348, 1326, 1236, 1186, 1160, 1096 cm^{-1} .

mp. 144-146 $^\circ\text{C}$.

No.1a - 1 2

CDCl₃, 300MHz

0.98-1.98(14H,m), 2.22-2.27(2H,m), 3.02(1H,m), 3.66(2H,s), 3.87(3H,s), 4.88(1H,d,J=8.9Hz), 5.18-5.24(2H,m), 6.99-7.02(2H,m), 7.55-7.66(2H,m), 7.88-7.89(2H,m), 7.89-7.92(2H,m).

IR(CHCl₃): 3374, 3270, 3016, 2948, 2870, 1728, 1608, 1518, 1487, 1458, 1437, 1348, 1157, 1037.

[α]_D²⁰ = +4.3° (CHCl₃, c=1.01, 24°C).

mp. 85-87°C.

No.1a - 1 3

CDCl₃, 300MHz

0.97-1.99(14H,m), 2.18(1H,m), 2.30(2H,t,J=7.2Hz), 3.04(1H,m), 3.86(3H,s), 5.18(1H,d,J=6.7Hz), 5.23-5.26(2H,m), 6.99-7.02(2H,m), 7.55-7.66(2H,m), 7.88-7.89(2H,m), 7.89-7.92(2H,m).

IR(CHCl₃): 3380, 3260, 3020, 2948, 2868, 1708, 1608, 1519, 1487, 1458, 1308, 1293, 1248, 1156 /cm.

[α]_D²⁰ = +18.3° (CHCl₃, c=1.00, 25.5°C).

No.1a - 1 4

CDCl₃, 300MHz

0.98-2.00(14H,m), 2.20(1H,m), 2.25(2H,t,J=7.2Hz), 3.02(1H,m), 3.87(3H,s), 4.88(1H,d,J=6.3Hz), 5.19-5.25(2H,m), 7.18(1H,dd,J=4.8,8.8Hz), 7.89(1H,d,J=4.8Hz), 7.40(1H,d,J=3.6Hz), 7.71-7.74(2H,m), 7.88-7.89(2H,m).

IR(CHCl₃): 3374, 3270, 3018, 2946, 2868, 1727, 1598, 1484, 1322 /cm.

[α]_D²⁰ = +5.6° (CHCl₃, c=1.01, 24°C).

mp. 69-71°C.

No.1a - 1 5

CDCl₃, 300MHz

0.95-2.00(14H,m), 2.17(1H,m), 2.32(2H,t,J=7.2Hz), 3.03(1H,m), 5.20(1H,d,J=6.9Hz), 5.24-5.38(2H,m), 7.18(1H,dd,J=4.8,8.8Hz), 7.88(1H,d,J=4.8Hz), 7.43(1H,d,J=3.8Hz), 7.78(2H,d,J=8.4Hz), 7.87(2H,d,J=8.4Hz).

IR(CHCl₃): 3260, 3022, 2948, 2868, 1709, 1598, 1404, 1321, 1154 /cm.

[α]_D²⁰ = +20.8° (CHCl₃, c=1.07, 28°C).

mp. 71-73°C.

No.1a - 1 6

CDCl₃, 300MHz

0.98-2.00(14H,m), 2.27(2H,t,J=7.6Hz), 2.28(1H,m), 3.18(1H,m), 3.68(3H,s), 4.90(1H,d,J=8.9Hz), 5.25-5.29(2H,m), 7.40-7.65(3H,m), 7.76(1H,d,J=8.4Hz), 7.90-8.02(4H,m).

IR(CHCl₃): 3378, 3278, 3018, 2946, 2868, 1728, 1598, 1458, 1394, 1322, 1159 /cm.

[α]_D²⁰ = +7.0° (CHCl₃, c=1.07, 24°C).

No.1a - 1 7

CDCl₃, 300MHz

1.02-2.07(14H,m), 2.25(1H,m), 2.34(2H,t,J=6.6Hz), 3.14(1H,m), 5.28-5.33(3H,m), 7.39-7.57(4H,m), 7.62-7.65(2H,m), 7.76(1H,d,J=8.1Hz), 7.89-8.02(4H,m).

IR(CHCl₃): 3260, 2948, 2868, 1709, 1593, 1394, 1324, 1157 /cm.

[α]_D²⁰ = +20.2° (CHCl₃, c=1.02, 24°C).

No.1a - 1 8

CDCl₃, 300MHz

1.05-1.97(14H,m), 2.25(2H,t,J=7.2Hz), 2.33(1H,m), 3.12(1H,m), 3.67(3H,s), 4.91(1H,d,J=8.8Hz), 5.24-5.29(2H,m), 7.24(1H,d,J=8.9Hz), 7.89-7.95(3H,m), 7.56(1H,d,J=8.9Hz), 7.59-7.63(2H,m).

IR(CHCl₃): 3372, 3272, 3018, 2948, 2888, 1727, 1433, 1331, 1152/cm.

[α]_D²⁰ = -5.7° (CHCl₃, c = 1.01, 25°C).

No. 1a - 19

CDCl₃, 300MHz

1.05-2.05(14H, m), 2.28-2.38(8H, m), 3.18(1H, m), 5.19(1H, d, J = 6.8Hz), 5.27-5.31(2H, m), 7.34(1H, d, J = 4.2Hz), 7.39-7.42(8H, m), 7.58(1H, d, J = 4.2Hz), 7.58-7.62(2H, m).

IR(CHCl₃): 3372, 3254, 3018, 2948, 2888, 1707, 1481, 1328, 1151/cm.

[α]_D²⁰ = +4.5° (CHCl₃, c = 1.01, 21.5°C).

No. 1a - 20

CDCl₃, 300MHz

1.05-2.00(14H, m), 2.28(2H, t, J = 7.5Hz), 2.32(1H, m), 3.11(1H, m), 3.68(3H, s), 4.92(1H, d, J = 8.0Hz), 5.27(2H, m), 7.06(1H, m), 7.10(1H, d, J = 8.6Hz), 7.25(1H, m), 7.32(1H, m), 7.49(1H, d, J = 8.6Hz).

IR(CHCl₃): 3372, 3272, 3018, 2948, 2888, 1727, 1438, 1417, 1322, 1151/cm.

[α]_D²⁰ = -9.2° (CHCl₃, c = 1.01, 25°C).

No. 1a - 21

CDCl₃, 300MHz

1.03-2.01(14H, m), 2.28-2.34(8H, m), 3.13(1H, m), 5.12(1H, d, J = 6.9Hz), 5.28-5.32(2H, m), 7.06(1H, m), 7.10(1H, d, J = 3.9Hz), 7.25(1H, m), 7.32(1H, m), 7.50(1H, d, J = 8.9Hz).

IR(CHCl₃): 3350, 3250, 2948, 1709, 1440, 1420, 1330, 1151.

[α]_D²⁰ = +2.5° (CHCl₃, c = 1.00, 25°C).

No. 1a - 22

CDCl₃, 300MHz

0.96-2.05(14H, m), 2.25(1H, m), 2.35(2H, t, J = 7.0Hz), 3.11(1H, m), 5.20-5.34(2H, m), 5.41(1H, d, J = 8.6Hz), 7.31-7.49(8H, m), 7.62(1H, d, J = 7.8Hz), 8.11(1H, d, d, J = 1.8 Hz, 7.8Hz), 8.35(1H, d, J = 1.8Hz).

IR(CHCl₃): 3384, 3271, 3025, 2958, 1708, 1608, 1559, 1527, 1357, 1158/cm.

[α]_D²⁰ = +18.8° (CHCl₃, c = 0.31, 22°C).

No. 1a - 23

CDCl₃, 300MHz

0.97-2.07(14H, m), 2.24(1H, m), 2.35(2H, t, J = 6.8Hz), 3.09(1H, m), 3.86(3H, s), 5.24-5.35(2H, m), 5.44(1H, d, J = 8.8Hz), 6.97-7.00(2H, m), 7.26-7.38(2H, m), 7.59(1H, d, J = 8.1Hz), 8.06(1H, d, d, J = 2.1 and 8.1Hz), 8.29(1H, d, J = 2.1Hz).

IR(CHCl₃): 3384, 3270, 2959, 1709, 1609, 1535, 1519, 1357, 1302, 1258, 1226, 1169/cm.

[α]_D²⁰ = +17.0° (CHCl₃, c = 1.00, 21°C).

No. 1a - 24

CDCl₃, 300MHz

0.95-2.00(14H, m), 2.20-2.25(1H, m), 2.36(2H, t, J = 7.2Hz), 3.02-3.10(1H, m), 3.66(3H, s), 4.92(1H, d, J = 8.6Hz), 5.16-5.31(2H, m), 7.62-7.60(2H, m), 7.94-8.08(6H, m).

IR(CHCl₃): 3376, 3020, 2946, 2868, 1726, 1436, 1358, 1298, 1164, 1090, 890/cm.

[α]_D²⁰ = +11.2 ± 0.5° (CHCl₃, c = 1.04, 23.5°C)

mp. 101-103°C

No. 1a - 25

CDCl₃, 300MHz

0.95-2.08(14H, m), 2.15-2.22(1H, m), 2.38(2H, t, J = 6.8Hz), 3.02-3.10(1H, m), 5.21-5.31(2H, m), 5.34(1H, d, J = 8.3Hz), 7.51-7.59(3H, m), 7.92-8.07(6H, m).

IR(CHCl₃): 3258, 3022, 2948, 2868, 1707, 1599, 1324, 1298, 1163, 1089, 1051, 892/cm.

m.

$[\alpha]_D^{25} = +29.8 \pm 0.7^\circ$ ($\text{CHCl}_3, c = 1.05, 25^\circ\text{C}$)

mp. 158-160°C

5 No. 1a - 26

$\text{C}_{12}\text{H}_{15}\text{NO}_2\text{SNa}$ 0.8%에 대 원소분석 계산치: C, 60.29; H, 6.15; N, 5.11; S, 6.19; Na, 4.44; 측정치: C, 60.15; H, 6.19; N, 5.15; S, 6.08; Na, 4.98.

$[\alpha]_D^{25} = -16.6^\circ$ ($\text{CHCl}_3, c = 1.04, 25.0^\circ\text{C}$).

No. 1a - 27

$\text{CDCl}_3, 300\text{MHz}$

0.92-1.98(14H, m), 2.20(1H, m), 2.26(2H, t, $J = 7.5\text{Hz}$), 3.08(1H, m), 3.12(6H, s), 3.66(3H, s), 4.87(1H, d, $J = 6.6\text{Hz}$), 5.15-5.32(2H, m), 6.73-6.80(2H, m), 7.55-8.00(6H, m).

IR(CHCl_3): 3376, 3020, 2946, 1726, 1601, 1518, 1442, 1419, 1362, 1312, 1163, 1138, 1088 cm^{-1} .

$[\alpha]_D^{25} = +55.3^\circ$ ($\text{CHCl}_3, c = 0.52, 24.0^\circ\text{C}$).

mp. 158-163°C

No. 1a - 28

$\text{CDCl}_3 + \text{CD}_3\text{OD}, 300\text{MHz}$

0.99-2.14(14H, m), 2.21(1H, m), 2.31(2H, t, $J = 7.2\text{Hz}$), 2.94(1H, m), 3.12(6H, s), 5.22-5.38(2H, m), 6.73-6.81(2H, m), 7.87-8.00(6H, m).

IR(KBr): 3434, 3309, 2948, 1708, 1604, 1520, 1442, 1418, 1366, 1312, 1252, 1164, 1155, 1134, 1091 cm^{-1} .

$[\alpha]_D^{25}$ 측정할 수 없음 (유체, 불충분한 에너지)

mp. 193-195°C

No. 1a - 29

$\text{CD}_3\text{OD}, 300\text{MHz}$

1.02-1.98(14H, m), 2.10(2H, t, $J = 7.8\text{Hz}$), 2.16(1H, m), 2.98(1H, m), 3.11(6H, s), 5.07-5.27(2H, m), 6.80-6.87(2H, m), 7.84-8.00(6H, m).

IR(KBr): 3425, 3087, 3004, 2949, 2871, 1604, 1565, 1520, 1444, 1420, 1364, 1312, 1253, 1168, 1138, 1090 cm^{-1} .

$[\alpha]_D^{25}$ 측정할 수 없음

No. 1a - 30

$\text{CDCl}_3, 300\text{MHz}$

0.95-1.99(14H, m), 2.22(1H, m), 2.26(2H, t, $J = 7.2\text{Hz}$), 2.35(3H, s), 3.06(1H, m), 3.66(3H, s), 4.95(1H, d, $J = 6.9\text{Hz}$), 5.15-5.30(2H, m), 7.26-7.32(2H, m), 7.97-8.06(6H, m).

IR(CHCl_3): 3374, 2996, 2948, 2868, 1768, 1728, 1591, 1495, 1435, 1368, 1299, 1238, 1192, 1163, 1139 cm^{-1} .

$[\alpha]_D^{25} = +12.9^\circ$ ($\text{CHCl}_3, c = 1.04, 26.0^\circ\text{C}$).

No. 1a - 31

$\text{CDCl}_3, 300\text{MHz}$

0.93-2.01(14H, m), 2.19(1H, m), 2.31(2H, t, $J = 7.2\text{Hz}$), 2.35(3H, s), 3.06(1H, m), 5.17-5.32(2H, m), 7.25-7.32(2H, m), 7.96-8.07(6H, m).

IR(CHCl_3): 3287, 3028, 2952, 2874, 1789, 1708, 1592, 1495, 1368, 1328, 1299, 1168, 1138, 1088, 1050, 1008 cm^{-1} .

$[\alpha]_D^{25} = +21.7^\circ$ ($\text{CHCl}_3, c = 0.51, 22^\circ\text{C}$).

No. 1a - 32

$\text{CDCl}_3, 300\text{MHz}$

.98-1.99(14H, m), 2.21(1H, m), 2.27(2H, t, $J = 7.2\text{Hz}$), 3.05(1H, m), 3.87(2H, s), 4.92(1H, d, $J = 6.6\text{Hz}$), 5.15-5.30(2H, m), 6.72(1H, s), 6.96-7.00(2H, m), 7.86-8.04(6H, m).

- IR(CHCl₃): 3374, 3378, 3018, 2948, 2888, 1725, 1606, 1589, 1502, 1488, 1396, 1280, 1271, 1184, 1135, 1069 /cm. $[\alpha]_D^{25} = +18.6^\circ$ (CHCl₃, c=1.00, 25.0°C).
- No.1a - 3 3
- 5 CDCl₃+CD₃OD 800MHz
0.98-2.08(14H,m), 2.20(1H,m), 2.28(2H,t,J=7.2Hz), 2.98(1H,m), 5.18-5.33(2H,m), 6.92-6.99(2H,m), 7.85-8.02(6H,m).
IR(KBr): 3385, 3248, 2948, 2876, 1717, 1601, 1505, 1480, 1399, 1288, 1280, 1219, 1165, 1136, 1093 /cm.
10 $[\alpha]_D^{25} = -18.0^\circ$ (CH₃OH, c=1.08, 25.0°C).
mp. 205-210°C
- No.1a - 3 4
mp. 83-83°C $[\alpha]_D^{25} = +18.8^\circ$ (CHCl₃, c=1.01, 25.5°C).
- 15
- No.1a - 3 5
mp. 80-82°C $[\alpha]_D^{25} = -1.8^\circ$ (CHCl₃, c=1.07, 22.0°C).
- No.1a - 3 6
- 20 TLC Rf=0.25 (에틸아세테이트/헥산 = 1:1 (0.5% 아세트산))
- No.1a - 3 7
CDCl₃ 800MHz
0.92-1.96(14H,m), 2.21(1H,m), 2.27(2H,t,J=7.4Hz), 3.01(1H,m), 3.66(3H,s), 4.7
26 1(1H,d,J=6.6Hz), 5.14-5.29(2H,m), 7.12(1H,d,J=16.2Hz), 7.34(1H,d,J=16.2Hz),
7.28-7.42(3H,m), 7.52-7.56(2H,m), 7.63(2H,d,J=8.7Hz), 7.85(2H,d,J=8.7Hz).
IR(CHCl₃): 3384, 3283, 3028, 2954, 2876, 1780, 1695, 1494, 1317, 1163, 1147 /cm.
 $[\alpha]_D^{25} = +10.5^\circ$ (CHCl₃, c=1.01, 24°C).
mp 116-117 °C.
- No.1a - 3 8
CDCl₃ 800MHz
0.93-1.99(14H,m), 2.17(1H,m), 2.32(2H,t,J=7.2Hz), 3.02(1H,m), 5.28-5.29(3H,m), 7.11(1H,d,J=16.2Hz), 7.23(1H,d,J=16.2Hz), 7.28-7.41(3H,m), 7.52-7.55(2H,m), 7.61(2H,d,J=8.7Hz), 7.86(2H,d,J=8.7Hz).
IR(CHCl₃): 3315, 3384, 3270, 3022, 3015, 2957, 2876, 2689, 1708, 1595, 1496, 1320, 1157 /cm.
 $[\alpha]_D^{25} = +27.1^\circ$ (CHCl₃, c=1.02, 24°C).
- No.1a - 3 9
CDCl₃ 800MHz
0.92-1.99(14H,m), 2.15(1H,m), 2.26(2H,t,J=7.4Hz), 3.01(1H,m), 3.68(3H,s), 4.9
6(1H,d,J=6.6Hz), 5.16-5.32(2H,m), 6.60(1H,d,J=12.0Hz), 6.74(1H,d,J=12.0Hz), 7.16-7.28(5H,m), 7.85(2H,d,J=8.4Hz), 7.72(2H,d,J=8.4Hz).
IR(CHCl₃): 3384, 3283, 3023, 3015, 2954, 2876, 1730, 1595, 1493, 1324, 1183, 1147 /cm.
 $[\alpha]_D^{25} = +13.7^\circ$ (CHCl₃, c=1.00, 24°C).
- No.1a - 4 0
CDCl₃ 800MHz
0.90-2.16(14H,m), 2.12(1H,m), 2.34(2H,t,J=7.2Hz), 3.02(1H,m), 5.16(1H,d,J=6.9Hz), 5.29-5.34(2H,m), 6.60(1H,d,J=12.8Hz), 6.74(1H,d,J=12.8Hz), 7.14-7.24(5H,m), 7.85(2H,d,J=8.1Hz), 7.72(2H,d,J=8.1Hz).
IR(CHCl₃): 3315, 3384, 3269, 3025, 3021, 3014, 2957, 2876, 2668, 1709, 1595, 1322, 1182, 1147 /cm.
 $[\alpha]_D^{25} = +26.4^\circ$ (CHCl₃, c=1.00, 24°C).
- No.1a - 4 1

CDCl₃, 300MHz
0.99-1.99(14H,m), 2.17(1H,m), 2.22(2H,t,J=7.2Hz), 2.00(1H,m), 2.94(2H,s),
5.20-5.28(2H,m), 6.90-6.95(2H,m), 6.99(1H,d,J=16.2Hz), 7.17(1H,d,J=16.2Hz),
7.46-7.49(2H,m), 7.58(2H,d,J=8.4Hz), 7.83(2H,d,J=8.4Hz).
IR(CHCl₃): 3255, 3018, 3002, 2950, 1709, 1590, 1509, 1457, 1404, 1302, 1250, 1153
/cm.
[α]_D = +20.3° (CHCl₃, c=1.00, 25°C).
mp. 99-100 °C

No. 1a - 4 2
CDCl₃, 300MHz
1.01-1.99(14H,m), 2.28(2H,t,J=7.2Hz), 2.30(1H,m), 3.10(1H,m), 3.56(2H,s), 5.0
7(1H,br), 5.25-5.30(2H,m), 6.99-7.04(2H,m), 7.16(1H,d,J=16.2Hz), 7.28-7.37(2
H,m), 7.47-7.50(2H,m).
IR(CHCl₃): 3372, 3276, 3020, 2946, 2870, 1737, 1491, 1483, 1331, 1152 /cm.
[α]_D = -11.5° (CHCl₃, c=1.07, 21.5°C).

No. 1a - 4 3
CDCl₃, 300MHz
0.98-2.00(14H,m), 2.11-2.38(2H,m), 3.12(1H,m), 5.10(1H,d,J=8.6Hz), 5.39-
5.32(2H,m), 6.99-7.04(2H,m), 7.29(1H,d,J=21.6Hz), 7.32-7.49(2H,m).
IR(CHCl₃): 3380, 3248, 3020, 2946, 2868, 1709, 1491, 1430, 1329, 1151 /cm.
[α]_D = +3.4° (CHCl₃, c=1.03, 25°C).

No. 1a - 4 4
CDCl₃, 300MHz
1.00-2.00(14H,m), 2.15(1H,m), 2.29(2H,t,J=7.4Hz), 2.90-3.13(2H,m), 3.68(2H,s),
4.74(1H,d,J=6.6Hz), 5.15-5.20(2H,m), 7.18-7.29(2H,m), 7.76(2H,d,J=8.1Hz).
IR(CHCl₃): 3384, 3282, 3063, 3023, 3023, 3016, 2953, 2876, 1730, 1599, 1496, 1319,
1157 /cm.
[α]_D = +2.3° (CHCl₃, c=1.00, 25°C).
mp. 85.0-86.0°C

No. 1a - 4 5
CDCl₃, 300MHz
0.90-2.06(14H,m), 2.09(1H,m), 2.35(2H,t,J=8.9Hz), 2.90-3.13(2H,m), 5.18(1H,
d,J=6.6Hz), 5.24-5.34(2H,m), 7.10-7.27(2H,m), 7.76(2H,d,J=8.4Hz).
IR(CHCl₃): 3510, 3384, 3270, 3087, 3063, 3026, 3018, 3014, 2955, 2876, 2670, 1706,
1599, 1498, 1318, 1157 /cm.
[α]_D = +8.5° (CHCl₃, c=1.01, 25°C).

No. 1a - 4 6
[α]_D = +6.8° (CHCl₃, c=1.05, 25°C). mp. 99-100°C.

No. 1a - 4 7
CDCl₃, 300MHz
0.97-2.01(14H,m), 2.14(1H,m), 2.35(2H,t,J=7.2Hz), 3.02(1H,m), 5.23(1H,d,J=5.
4Hz), 5.26-5.30(2H,m), 7.27-7.39(2H,m), 7.54-7.58(2H,m), 7.63-7.66(2H,m), 7.8
5-7.88(2H,m).
IR(CHCl₃): 3275, 3260, 3022, 2948, 2212, 1707, 1596, 1497, 1396, 1322, 1160 /cm.
[α]_D = +25.0° (CHCl₃, c=1.02, 24°C). mp. 117-118°C.

No. 1a - 4 8
CD₃OD, 300MHz
1.05-1.98(14H,m), 2.10-2.15(2H,m), 2.96(1H,m), 5.05-5.28(2H,m), 7.33-7.40(2
H,m), 7.554-7.56(2H,m), 7.69(1H,d,J=8.4Hz), 7.67(1H,d,J=8.4Hz).

No. 1a - 4 9

CDCl₃, 300MHz

0.96-1.97(14H,m), 2.24(1H,m), 2.31(2H,t,J=6.9Hz), 3.05(1H,m), 3.69(3H,s), 5.15(1H,d,J=6.6Hz), 5.25-5.27(2H,m), 7.40-7.43(2H,m), 7.61-7.64(2H,m), 7.85(1H,d,J=6.1Hz), 8.07(1H,dd,J=8.1,1.8Hz), 8.58(1H,d,J=1.8Hz).

IR(CHCl₃): 3374, 3020, 2948, 2870, 2212, 1728, 1608, 1530, 1493, 1437, 1346, 1157/cm.

[α]_D²⁰ = +2.4° (CHCl₃, c=1.02, 25°C). mp. 77-79°C.

No. 1a - 5 0

CDCl₃, 300MHz

1.00-2.02(14H,m), 2.20(1H,m), 2.34(2H,t,J=6.6Hz), 3.08(1H,m), 5.26-5.29(2H,m), 5.41(1H,d,J=6.9Hz), 7.40-7.43(2H,m), 7.61-7.64(2H,m), 7.84(1H,d,J=6.1Hz), 8.07(1H,dd,J=8.4,1.8Hz), 8.57(1H,dd,J=1.8Hz).

IR(CHCl₃): 3380, 3254, 2952, 2880, 2213, 1707, 1606, 1531, 1493, 1409, 1344, 1168/cm.

[α]_D²⁰ = +28.4° (CHCl₃, c=1.00, 25°C).

No. 1a - 5 1

CDCl₃, 300MHz

0.95-1.98(14H,m), 2.23(1H,m), 2.30(2H,t,J=7.2Hz), 3.00(1H,m), 3.66(3H,s), 4.56(2H,br), 4.70(1H,d,J=6.9Hz), 5.20-5.29(2H,m), 7.15(1H,dd,J=7.8,1.8Hz), 7.23(1H,d,J=1.8Hz), 7.36-7.39(2H,m), 7.48(1H,d,J=7.8Hz), 7.53-7.56(2H,m).

IR(CHCl₃): 3494, 3386, 3028, 2952, 2874, 1725, 1611, 1559, 1497, 1423, 1317, 1162/cm.

No. 1a - 5 2

CDCl₃, 300MHz

0.96-2.04(14H,m), 2.20(1H,m), 2.36(2H,t,J=6.9Hz), 2.99(1H,m), 5.17(1H,d,J=6.3Hz), 5.28-5.31(2H,m), 7.18(1H,dd,J=9.6,1.8Hz), 7.35(1H,m), 7.56-7.59(2H,m).

7.46(1H,d,J=7.8Hz), 7.52-7.56(2H,m).

IR(CHCl₃): 3482, 3378, 3260, 3022, 2948, 2868, 1708, 1612, 1495, 1422, 1317/cm.

[α]_D²⁰ = +15.0° (CHCl₃, c=1.00, 24°C).

No. 1a - 5 3

CDCl₃, 300MHz

1.01-2.05(15H,m), 2.31(2H,t,J=7.2Hz), 3.10(1H,m), 3.67(2H,s), 5.02(1H,br), 5.36-5.38(2H,m), 7.18(1H,d,J=4.2Hz), 7.36-7.39(2H,m), 7.48(1H,d,J=4.2Hz), 7.51-7.55(2H,m).

IR(CHCl₃): 3372, 3270, 3018, 3004, 2946, 2868, 2202, 1728, 1488, 1433, 1336, 1154/cm.

[α]_D²⁰ = +0.6° (CHCl₃, c=1.11, 25°C). [α]_m²⁰ = +17.8° (CHCl₃, c=1.11, 25°C).

No. 1a - 5 4

CDCl₃, 300MHz

0.99-2.11(14H,m), 2.27(1H,m), 2.37(2H,t,J=7.5Hz), 3.18(1H,m), 5.16(1H,d,J=6.6Hz), 5.31-5.35(2H,m), 7.18(1H,d,J=3.6Hz), 7.27-7.39(2H,m), 7.50(1H,d,J=3.6Hz), 7.52-7.55(2H,m).

IR(CHCl₃): 3484, 3370, 3246, 2948, 2868, 2202, 1708, 1488, 1429, 1336, 1153/cm.

[α]_D²⁰ = +17.8° (CHCl₃, c=1.00, 24°C). mp. 95-98°C.

No. 1a - 5 5

CDCl₃, 300MHz

0.95-1.93(14H,m), 2.15(1H,m), 2.34(2H,t,J=7.5Hz), 3.00(1H,m), 3.66(3H,s), 5.10-5.30(2H,m), 7.40-7.60(2H,m), 7.70(1H,d,J=7.8Hz), 8.08(1H,d,J=6.1Hz).

IR(CHCl₃): 3386, 3020, 2948, 2868, 2210, 1737, 1490, 1458, 1437, 1341, 1165/cm.

[α]_D²⁰ = -58.4° (CHCl₃, c=1.00, 26°C). mp. 84-88°C.

No.1a - 5 6

CDCl₃, 300MHz

0.99-1.95(14H,m), 2.10(1H,m), 2.37(2H,t, J=6.9Hz), 2.00(1H,m), 5.17-5.31(2H,m), 5.38(1H,d, J=6.9Hz), 7.39-7.60(7H,m), 7.70(1H,dd, J=7.8,1.5Hz), 8.07(1H, J=6.6,1.5Hz).

IR(CHCl₃): 2864, 2926, 2952, 2874, 2812, 1707, 1597, 1491, 1458, 1411, 1341, 1164/cm.

[α]_D²⁰ = -48.1° (CHCl₃, c=1.00, 25°C).

No.1a - 5 7

CDCl₃, 300MHz

0.99-1.97(14H,m), 2.23-2.30(3H,m), 2.01(1H,m), 3.67(2H,s), 5.17-5.26(2H,m), 7.36-7.38(3H,m), 7.50-7.55(3H,m), 7.60(1H,m), 7.83(1H,m), 8.05(1H,m).

IR(CHCl₃): 2876, 2920, 2946, 2870, 1727, 1598, 1491, 1437, 1412, 1330, 1245, 1163/cm.

[α]_D²⁰ = -12.7° (CHCl₃, c=1.00, 24°C).

No.1a - 5 8

CDCl₃, 300MHz

0.97-1.98(14H,m), 2.20(1H,m), 2.35(2H,t, J=6.9Hz), 2.02(1H,m), 5.19-5.28(3H,m), 7.36-7.38(3H,m), 7.47-7.55(3H,m), 7.69(1H,m), 7.83(1H,m), 8.04(1H,m).

IR(CHCl₃): 2876, 2960, 3022, 3002, 2948, 2868, 2820, 1708, 1598, 1490, 1455, 1412, 1327, 1162/cm.

[α]_D²⁰ = -8.6° (CHCl₃, c=1.01, 24°C).

No.1a - 5 9

CDCl₃, 300MHz

0.98-1.99(24H,m), 2.20(1H,m), 2.28(2H,t, J=7.6Hz), 2.55(1H,s), 2.96(1H,m), 3.6(3H,s), 4.99(1H,d, J=6.6Hz), 5.18-5.20(2H,m), 7.53(2H,d, J=8.4Hz), 7.82(2H,d, J=8.4Hz).

IR(CHCl₃): 3582, 3376, 3002, 2936, 2852, 1725, 1591, 1490, 1437, 1392, 1325, 1160/cm.

[α]_D²⁰ = -5.8° (CHCl₃, c=1.00, 24°C).

No.1a - 5 0

CDCl₃, 300MHz

0.96-2.05(24H,m), 2.22(1H,m), 2.33(2H,m), 2.63(1H,m), 5.22-5.36(2H,m), 5.30(1H,d, J=5.7Hz), 7.50(2H,d, J=8.7Hz), 7.50(3H,d, J=8.7Hz).

IR(CHCl₃): 3376, 3260, 3022, 2936, 2852, 1710, 1592, 1491, 1452, 1395, 1325, 1159/cm.

[α]_D²⁰ = -3.9° (CHCl₃, c=1.06, 24°C).

mp. 88-91°C

No.1a - 5 1

CDCl₃, 300MHz

0.95-2.24(23H,m), 2.29(2H,m), 2.99(1H,m), 3.69(3H,s), 4.75(1H,d, J=6.3Hz), 5.31-5.24(3H,m), 6.28(1H,m), 7.50-7.52(2H,m), 7.77-7.80(2H,m).

IR(CHCl₃): 3374, 3270, 3018, 2942, 2868, 2196, 1728, 1589, 1490, 1425, 1324, 1158/cm.

[α]_D²⁰ = +7.7° (CHCl₃, c=1.02, 24°C). mp. 98-95°C

No.1a - 5 2

CDCl₃, 300MHz

0.96-2.45(23H,m), 2.36(2H,d, J=8.9Hz), 2.99(1H,m), 5.24(1H,d, J=6.3Hz), 5.24-5.32(2H,m), 6.28(1H,m), 7.50-7.53(2H,m), 7.78-7.81(2H,m). IR(CHCl₃): 2468, 374, 3260, 3020, 2942, 2868, 2196, 1592, 1490, 1455, 1328, 1222, 1157/cm.

[α]_D²⁰ = +19.4° (CHCl₃, c=1.02, 24°C).

No.1a - 8 3

CDCl₃, 800MHz

0.95-1.95(2H,m), 2.16(1H,m), 2.29(2H,t,J=7.2Hz), 2.43(2H,t,J=6.9Hz), 2.94(1H,m), 3.69(3H,s), 4.95(1H,d,J=6.9Hz), 5.21-5.24(2H,m), 7.49(2H,d,J=8.7Hz), 7.79(2H,J=8.7Hz).

IR(CHCl₃): 3376, 3016, 2946, 2866, 2222, 1727, 1592, 1456, 1435, 1326, 1158/cm.

[α]_D²⁰ = +8.7° (CHCl₃, c=1.00, 25°C).

No.1a - 8 4

CDCl₃, 800MHz

0.93-1.97(2H,m), 2.35(2H,t,J=7.2Hz), 2.48(2H,t,J=7.2Hz), 3.00(1H,m), 5.08(1H,d,J=6.6Hz), 5.28-5.27(2H,m), 7.49(2H,d,J=8.7Hz), 7.75(2H,d,J=8.7Hz).

IR(CHCl₃): 3260, 3020, 2948, 2864, 2222, 1708, 1592, 1489, 1456, 1397, 1224, 1156/cm.

[α]_D²⁰ = +14.4° (CHCl₃, c=1.00, 25°C) mp. 70-71°C.

No.1a - 8 5

CDCl₃, 800MHz

0.95-1.98(14H,m), 2.18(1H,m), 2.30(2H,t,J=7.2Hz), 3.00(1H,m), 3.67(3H,s), 4.82(1H,d,J=6.9Hz), 5.22-5.25(2H,m), 5.84(1H,br), 5.82-6.85(2H,m), 7.42-7.45(2H,m), 7.59-7.62(2H,m), 7.82-7.85(2H,m).

IR(CHCl₃): 3576, 3374, 3016, 2946, 2866, 2208, 1725, 1607, 1587, 1514, 1485, 1325, 1270, 1162, 1133/cm.

[α]_D²⁰ = +9.1° (CHCl₃, c=1.03, 24°C) mp. 111-112°C

No.1a - 8 6

CDCl₃, 300MHz

0.97-2.08(14H,m), 2.15(1H,m), 2.35(2H,t,J=7.6Hz), 3.00(1H,m), 5.17(1H,d,J=6.6Hz), 5.26-5.30(2H,m), 6.82-6.85(2H,m), 7.42-7.45(2H,m), 7.59-7.62(2H,m), 7.8

2-7.85(2H,m).

IR(CHCl₃): 3260, 2948, 2670, 2208, 1709, 1607, 1587, 1514, 1396, 1325, 1270, 1162, 1133/cm.

[α]_D²⁰ = -21.0° (CHCl₃, c=1.00, 23°C) mp. 161-162°C

No.1a - 8 7

CDCl₃, 300MHz

0.95-1.98(14H,m), 2.20(1H,m), 2.29(2H,t,J=7.2Hz), 3.01(1H,m), 3.67(3H,s), 4.82(1H,d,J=6.6Hz), 5.19-5.27(2H,m), 7.06-7.10(2H,m), 7.51-7.56(2H,m), 7.61-7.64(2H,m), 7.84-7.87(2H,m).

IR(CHCl₃): 3374, 3260, 3020, 2948, 2868, 2214, 1727, 1589, 1509, 1485, 1327, 1288, 1161, 1134/cm.

[α]_D²⁰ = +6.7° (CHCl₃, c=1.01, 24°C) mp. 84-85°C

No.1a - 8 8

CDCl₃, 800MHz

0.96-2.01(14H,m), 2.15(1H,m), 2.34(2H,t,J=6.9Hz), 3.02(1H,m), 5.33-5.27(3H,m), 7.04-7.10(2H,m), 7.51-7.56(2H,m), 7.61-7.64(2H,m), 7.85-7.88(2H,m).

IR(CHCl₃): 3374, 3258, 3020, 2948, 2868, 2214, 1708, 1589, 1509, 1455, 1398, 1322, 1156/cm.

[α]_D²⁰ = +22.6° (CHCl₃, c=1.02, 24°C) mp. 185-186°C

No.1a - 8 9

CDCl₃, 800MHz

0.95-1.98(14H,m), 2.19(1H,m), 2.29(2H,t,J=7.2Hz), 2.59(3H,s), 3.01(1H,m), 3.69(3H,s), 4.80(1H,d,J=6.6Hz), 5.20-5.29(2H,m), 7.18(2H,d,J=8.1Hz), 7.44(2H,d,J=8.1Hz), 7.62(2H,d,J=8.4Hz), 7.84(2H,d,J=8.4Hz).

IR(CHCl₃): 3374, 3022, 2946, 2868, 2210, 1727, 1589, 1511, 1485, 1323, 1161, 1133/cm.

$[\alpha]_D^{25} = +9.3^\circ$ ($\text{CHCl}_3, c = 1.02, 24^\circ\text{C}$).

mp. 116-118°C

No. 1a - 7 0

CDCl_3 , 800MHz

1.15-2.00(14H, m), 2.13(1H, m), 2.28-2.38(5H, m), 2.04(1H, m), 5.14(1H, d, J=6.6 Hz), 5.25-5.30(2H, m), 7.17(2H, d, J=7.8 Hz), 7.44(2H, d, J=7.8 Hz), 7.62(2H, d, J=8.4 Hz), 7.65(2H, d, J=8.4 Hz).

IR(CHCl_3): 3380, 3260, 3030, 2948, 2868, 2210, 1708, 1590, 1511, 1396, 1324, 1160, 1132/cm.

$[\alpha]_D^{25} = +24.6^\circ$ ($\text{CHCl}_3, c = 1.00, 24^\circ\text{C}$).

No. 1a - 7 1

CDCl_3 , 800MHz

0.95-1.95(14H, m), 2.19(1H, m), 2.29(2H, t, J=7.2 Hz), 3.00(1H, m), 3.20(1H, s), 3.6(5H, s), 4.81(1H, d, J=6.6 Hz), 5.20-5.27(2H, m), 7.46-7.54(4H, m), 7.62-7.65(2H, m), 7.85-7.88(2H, m).

IR(CHCl_3): 3374, 3290, 3018, 3002, 2946, 2868, 2212, 2110, 1726, 1591, 1507, 1455, 1401, 1324, 1181/cm.

$[\alpha]_D^{25} = +9.6^\circ$ ($\text{CHCl}_3, c = 1.01, 24^\circ\text{C}$), mp. 136-138°C.

No. 1a - 7 2

CDCl_3 , 800MHz

0.96-2.01(14H, m), 2.14(1H, m), 2.35(2H, t, J=7.2 Hz), 3.06(1H, m), 3.20(1H, s), 5.16(1H, d, J=7.2 Hz), 5.26-5.29(2H, m), 7.45-7.53(4H, m), 7.63(2H, d, J=8.4 Hz), 7.87(2H, d, J=8.4 Hz).

IR(CHCl_3): 3462, 3374, 3290, 3024, 2948, 2868, 2212, 2110, 1708, 1591, 1508, 1455, 1401, 1321, 1274, 1160, 1132/cm.

$[\alpha]_D^{25} = +24.3^\circ$ ($\text{CHCl}_3, c = 1.03, 24^\circ\text{C}$), mp. 96-99°C

No. 1a - 7 3

CDCl_3 , 800MHz

0.95-1.98(14H, m), 2.19(1H, m), 2.27-2.32(3H, m), 3.01(1H, m), 3.67(3H, s), 4.80(1H, d, J=6.6 Hz), 5.20-5.27(2H, m), 7.12(2H, m), 7.56(2H, m), 7.63(2H, m), 7.84(2H, m).

IR(CHCl_3): 3374, 3276, 3018, 2946, 2868, 2214, 1762, 1730, 1589, 1506, 1435, 1368, 1161/cm.

$[\alpha]_D^{25} = +7.8^\circ$ ($\text{CHCl}_3, c = 1.02, 24^\circ\text{C}$), mp. 102-104°C

No. 1a - 7 4

CDCl_3 , 800MHz

0.95-2.05(14H, m), 2.15(1H, m), 2.32-2.37(5H, m), 3.02(1H, m), 5.14(1H, d, J=6.6 Hz), 5.26-5.30(2H, m), 7.10-7.13(2H, m), 7.54-7.57(2H, m), 7.62-7.64(2H, m), 7.84-7.87(2H, m).

IR(CHCl_3): 3482, 3350, 3022, 2946, 2868, 2214, 1716, 1709, 1589, 1507, 1454, 1396, 1366, 1322, 1195, 1161/cm.

$[\alpha]_D^{25} = +15.0^\circ$ ($\text{CHCl}_3, c = 1.00, 24^\circ\text{C}$), mp. 129-131°C

No. 1a - 7 5

CDCl_3 , 800MHz

0.95-1.99(14H, m), 2.20(1H, m), 2.30(2H, t, J=7.2 Hz), 3.02(1H, m), 3.67(3H, s), 3.94(3H, s), 4.79(1H, d, J=6.6 Hz), 5.19-5.29(2H, m), 7.60-7.63(2H, m), 7.65-7.67(2H, m), 7.86-7.89(2H, m), 8.04-8.06(2H, m).

IR(CHCl_3): 3378, 3018, 2946, 2880, 1720, 1604, 1455, 1507, 1276, 1161, 1106 /cm.

$[\alpha]_D^{25} = +7.3^\circ$ ($\text{CHCl}_3, c = 1.01, 25^\circ\text{C}$), mp. 122-123°C

No. 1a - 7 6

$\text{CDCl}_3 + \text{CD}_3\text{OD}$ 800MHz

1.04-2.05(14H,m), 2.19(1H,m), 2.22(2H,t,J=6.9Hz), 2.93(1H,m), 5.27-5.31(2H,m), 7.60-7.63(2H,m), 7.65-7.69(2H,m), 7.86-7.89(2H,m), 8.05-8.07(2H,m).
IR(CHCl₃): 3402, 3239, 2953, 2876, 2865, 2549, 1455, 1422, 1313, 1281, 1164 /cm.
[α]_D²⁰ = -21.1° (CH₃OH, c=1.03, 25°C). mp. 227-229(dec.)

No. 1a - 7 7

CDCl₃, 300MHz

0.96-1.99(14H,m), 2.20(1H,m), 2.30(2H,t,J=7.2Hz), 3.02(1H,m), 3.66(3H,s), 4.8
8(1H,d,J=8.3Hz), 5.19-5.29(2H,m), 7.67-7.72(4H,m), 7.89-7.91(2H,m), 8.24-8.2
7(2H,m).

IR(CHCl₃): 3276, 3276, 3020, 2946, 2870, 2314, 1725, 1594, 1519, 1455, 1435, 138
9, 1344, 1161/cm.

[α]_D²⁰ = +7.7° (CHCl₃, c=1.02). mp. 87-89°C

No. 1a - 7 8

CDCl₃, 300MHz

0.98-2.00(14H,m), 2.15(1H,m), 2.34(2H,t,J=7.2Hz), 3.02(1H,m), 5.24-5.28(2H,m),
5.32(1H,d,J=5.7Hz), 7.67-7.72(4H,m), 7.89-7.92(2H,m), 8.28-8.26(2H,m).

IR(CHCl₃): 3374, 3260, 2948, 2314, 1708, 1595, 1344, 1160/cm.

[α]_D²⁰ = +23.8° (CHCl₃, c=1.00). mp. 102-103°C.

No. 1a - 7 9

CDCl₃, 300MHz

0.93-2.02(14H,m), 2.13(1H,m), 2.36(2H,t,J=7.1Hz), 3.05(1H,m), 3.84(3H,s), 5.1
8(1H,br), 5.27-5.31(2H,m), 5.85-6.91(2H,m), 7.48-7.50(2H,m), 7.60-7.63(2H,m),
7.83-7.85(2H,m).

IR(CHCl₃): 3280, 3252, 3020, 2950, 2868, 2208, 1708, 1589, 1511, 1457, 1396, 1221,
1286, 1160/cm.

[α]_D²⁰ = +28.7° (CHCl₃, c=1.00). mp. 75-77°C

No. 1a - 8 0

CDCl₃, 300MHz

0.96-1.99(14H,m), 2.21(1H,m), 2.30(2H,t,J=7.8Hz), 3.02(1H,m), 3.68(3H,s), 4.8
0(1H,d,J=6.6Hz), 5.19-5.28(2H,m), 7.51-7.77(5H,m), 7.87-7.90(2H,m), 8.13(1H,
m).

IR(CHCl₃): 3374, 3270, 3018, 2946, 2868, 2216, 1726, 1607, 1567, 1527, 1495, 1456,
1436, 1244, 1296, 1161/cm.

[α]_D²⁰ = +7.4° (CHCl₃, c=1.00, 23°C). mp. 65-70°C

No. 1a - 8 1

CDCl₃, 300MHz

0.97-2.01(14H,m), 2.16(1H,m), 2.34(2H,t,J=7.2Hz), 3.01(1H,m), 5.22-5.28(3H,m),
7.51(1H,m), 7.66(1H,m), 7.70-7.76(3H,m), 7.88-7.91(2H,m), 8.12(1H,dd,J=6.
9Hz, 1.5Hz).

IR(CHCl₃): 3480, 3382, 3262, 3026, 2952, 2872, 2318, 1708, 1607, 1567, 1526, 1396,
1348, 1225, 1160/cm.

[α]_D²⁰ = +22.0° (CHCl₃, c=1.00). mp. 92-94°C

20 No. 1a - 8 2

CDCl₃, 300MHz

0.95-1.98(14H,m), 2.20(1H,m), 2.29(2H,t,J=7.2Hz), 3.01(1H,m), 3.67(3H,s), 4.3
0(2H,br), 4.79(1H,d,J=6.9Hz), 5.20-5.29(2H,m), 6.71-6.76(2H,m), 7.18(1H,m), 7.
87(1H,dd,J=7.8, 1.2Hz), 7.61-7.65(2H,m), 7.82-7.87(2H,m).

IR(CHCl₃): 3376, 3020, 2946, 2868, 2202, 1725, 1612, 1589, 1484, 1454, 1315, 1253,
1161/cm.

[α]_D²⁰ = +8.9° (CHCl₃, c=1.00, 22°C). mp. 68-70°C

No. 1a - 8 3

CDCl₃ 300MHz
0.97-1.99(14H,m), 2.17(1H,m), 2.23(2H,t,J=6.9Hz), 2.99(1H,m), 5.20-5.28(2H,m), 5.37(1H,d,J=6.9Hz), 6.45(2H,br), 6.71-6.76(2H,m), 7.19(1H,dd,J=7.8,6.6Hz), 7.37(1H,m), 7.62(2H,d,J=8.4Hz), 7.85(2H,d,J=8.4Hz).
IR(CHCl₃): 3472, 3378, 3360, 3022, 2950, 2868, 2204, 1708, 1612, 1589, 1484, 1454, 1396, 1316, 1160/cm.
[α]_D²⁰ = +17.1° (CHCl₃, c=1.01).

No.1a - 8 4
CDCl₃ 300MHz
1.00-2.08(14H,m), 2.21(1H,m), 2.37(2H,t,J=6.9Hz), 3.06(1H,m), 3.36(3H,s), 5.2-5.33(2H,m), 5.45(1H,d,J=6.6Hz), 6.91-6.94(2H,m), 7.56-7.59(2H,m), 7.81(1H,d,t,J=8.1Hz), 8.04(1H,d,d,J=8.1&1.8Hz), 8.57(1H,d,J=2.1Hz).
IR(CHCl₃): 3492, 3254, 3028, 2954, 2202, 1708, 1597, 1512, 1344, 1291, 1250/cm.
[α]_D²⁰ = +27.4° (CHCl₃, c=0.58, 22°C).

No.1a - 8 5
CDCl₃ 300MHz
0.96-2.05(14H,m), 2.20(1H,m), 2.35(2H,t,J=6.9Hz), 2.99(1H,m), 3.34(2H,s), 5.2-5.31(2H,m), 6.69(2H,d,J=6.7Hz), 7.19(1H,brs), 7.29(1H,brs), 7.45-7.50(2H,m).
IR(CHCl₃): 3476, 3378, 3020, 2950, 2868, 2202, 1708, 1606, 1511, 1421, 1311, 1287, 1246, 1155/cm.
[α]_D²⁰ = +17.1° (CHCl₃, c=1.00, 22°C).

No.1a - 8 6
CDCl₃ 300MHz
1.03-2.05(14H,m), 2.21(1H,m), 2.37(2H,t,J=6.9Hz), 3.04(1H,m), 5.29-5.28(2H,m), 5.57(1H,d,J=6.3Hz), 6.84-6.87(2H,m), 7.50-7.53(2H,m), 7.79(1H,d,J=8.1Hz), 8.08(1H,d,d,J=1.5&5.1Hz), 8.57(1H,d,J=1.5Hz).
IR(CHCl₃): 3250, 3024, 2950, 2868, 2200, 1707, 1515, 1344, 1271, 1166, 1143/cm.
[α]_D²⁰ = +21.3° (CHCl₃, c=0.26, 22°C).

No.1a - 8 7
CD₃OD 300MHz
1.04-2.00(14H,m), 2.18(1H,m), 2.26(2H,t,J=5.4Hz), 2.98(1H,m), 5.19-5.24(2H,m), 6.77-6.80(2H,m), 7.05(1H,d,d,J=2.1&2.1Hz), 7.22(1H,d,J=2.1Hz), 7.38-7.42(2H,m).
IR(CHCl₃): 3377, 2952, 2878, 2204, 1705, 1607, 1515, 1425, 1312, 1267, 1222, 1162/cm.
[α]_D²⁰ = -15.6° (CH₃OH, c=1.02, 22°C).

No.1a - 8 8
CDCl₃ 300MHz
0.90-1.96(14H,m), 2.22-2.31(2H,m), 2.95(1H,m), 3.65(3H,s), 4.57(1H,d,J=6.6Hz), 5.13-5.22(2H,m), 7.46-7.62(2H,m), 7.82-7.89(4H,m), 7.90-7.96(2H,m), 8.42(1H,brs).
IR(CHCl₃): 3376, 3016, 2946, 2868, 1720, 1677, 1592, 1514, 1496, 1429, 1376, 1314, 1241, 1156, 1094 /cm.
[α]_D²⁰ = -10.7° (CHCl₃, c=1.04, 22.0°C) mp. 134-136°C

No.1a - 8 9
CDCl₃+CD₃OD 300MHz
0.96-2.08(14H,m), 2.23(1H,m), 2.28(2H,t,J=7.2Hz), 2.89(1H,m), 5.20-5.32(2H,m), 7.46-7.62(2H,m), 7.82-7.97(2H,m).
IR(KBr): 3272, 3007, 2952, 2874, 1708, 1660, 1592, 1527, 1498, 1433, 1400, 1317, 1260, 1152, 1094 /cm.
[α]_D²⁰ = -24.4° (CH₃OH, c=1.02, 25.0°C).

No.1a - 9 0

CDCl₃ 300MHz

0.89-1.96(14H,m), 2.25-2.83(8H,m), 2.92(1H,m), 3.67(3H,s), 4.85(1H,d,J=6.9H
s), 5.10-5.25(2H,m), 7.81-7.90(4H,m), 8.10-8.18(2H,m), 8.81-8.40(2H,m), 8.77(1
H,s).

IR(CHCl₃): 8372, 8018, 2946, 2868, 1718, 1685, 1592, 1527, 1436, 1397, 1346, 1318,
1256, 1154, 1099 /cm.

[α]_D = -16.1° (CHCl₃, c=1.00, 23.0°C).

No.1a - 9 1

CDCl₃+CD₃OD 300MHz

0.94-2.02(14H,m), 2.18-2.36(8H,m), 2.87(1H,m), 5.15-5.30(2H,m), 7.82-7.92(4
H,m), 8.09-8.16(2H,m), 8.30-8.37(2H,m).

IR(KBr): 8284, 8112, 8006, 2952, 2874, 1707, 1598, 1528, 1498, 1399, 1348, 1320, 1
259, 1158, 1098 /cm.

[α]_D = -26.3° (CH₃OH, c=1.01, 22°C).

No.1a - 9 2

CDCl₃ 300MHz

0.98-1.95(14H,m), 2.22-2.81(8H,m), 2.98(1H,m), 3.68(3H,s), 5.07(1H,d,J=6.9H
s), 5.10-5.24(2H,m), 7.18(1H,m), 7.86-7.48(2H,m), 7.70(2H,d,J=7.8Hz), 7.88-8.
05(4H,m), 8.60(1H,brs).

IR(CHCl₃): 3382, 3008, 2952, 1720, 1675, 1599, 1525, 1499, 1488, 1321, 1252, 1161,
1087 /cm.

[α]_D = -18.6° (CHCl₃, c=1.03, 24.0°C) mp. 100-101°C

No.1a - 9 3

CDCl₃+CD₃OD 300MHz

0.96-2.00(14H,m), 2.18-2.35(8H,m), 2.90(1H,m), 5.15-5.30(2H,m), 7.18(1H,m),
7.33-7.42(2H,m), 7.65-7.74(2H,m), 7.90-8.08(4H,m).

IR(KBr): 3347, 3194, 3011, 2955, 2875, 1706, 1650, 1602, 1544, 1489, 1448, 1325,
1285, 1165, 1091 /cm.

[α]_D = -19.4° (CH₃OH, c=1.00, 24.0°C) mp. 158-159°C

No.1a - 9 4

CD₃OD 300MHz

1.05-2.00(14H,m), 2.14(1H,m), 2.28(2H,t,J=7.2Hz), 2.98(1H,m), 3.80(3H,s), 5.1
3-5.27(2H,m), 6.88-6.98(2H,m), 7.54-7.64(2H,m), 7.94-8.12(4H,m).

IR(KBr): 3370, 3006, 2952, 1708, 1649, 1604, 1541, 1512, 1480, 1441, 1414, 1328, 1
302, 1248, 1162, 1107, 1090, 1032 /cm.

[α]_D = -19.1° (CH₃OH, c=1.01, 24°C).

No.1a - 9 5

CD₃OD 300MHz

1.04-2.02(14H,m), 2.14(1H,m), 2.23(2H,t,J=7.2Hz), 2.98-3.02(7H,m), 5.18-5.27
(2H,m), 6.82-6.92(2H,m), 7.51-7.59(2H,m), 7.95-8.03(2H,m), 8.04-8.11(2H,m).

IR(KBr): 3370, 3006, 2953, 1708, 1649, 1604, 1541, 1512, 1480, 1441, 1414, 1328, 1
302, 1248, 1162, 1107, 1080, 1032 /cm.

[α]_D = -17.6° (CH₃OH, c=1.01, 24°C).

No.1a - 9 6

CD₃OD 300MHz

1.03-2.02(14H,m), 2.14(1H,m), 2.23(2H,t,J=7.2Hz), 2.98(1H,m), 5.18-5.27(2H,
m), 6.75-6.84(2H,m), 7.48-7.52(2H,m), 7.94-8.12(4H,m).

IR(KBr): 3389, 3197, 2953, 2875, 1707, 1644, 1606, 1541, 1514, 1446, 1328, 1292, 1
259, 1240, 1225, 1161, 1091 /cm.

[α]_D = -18.7° (CH₃OH, c=1.00, 24°C) mp. 198-198°C

No.1a - 97

d_6 -DMSO 300MHz

1.05-2.08(15H,m),2.15(3H,t,J=7.5Hz),2.89(1H,m),5.18-5.28(2H,m),6.78-7.12(3H,m),7.78(1H,d,d,J=1.4 Hz(7.8Hz),7.91-7.98(3H,m),8.14(2H,d,J=8.4Hz),9.71(1H,s).

IR(KBr):3407,3191,2958,1711,1646,1614,1603,1537,1457,1328,1162,1151/cm.

$[\alpha]_D^{20} = -20.7^\circ$ ($CH_3OH, c=1.01, 21^\circ C$).

No.1a - 98

$CDCl_3$ 300MHz

0.98-2.00(14H,m),2.21(1H,m),2.81(2H,t,J=7.2Hz),2.93(1H,m),3.84(3H,s),3.85(3H,s),5.15-5.30(2H,m),5.45(1H,d,J=8.3Hz),7.04(2H,s),7.78-7.88(2H,m),7.90-7.98(2H,m),8.58(1H,s).

IR($CHCl_3$):3264,3005,2954,2874,1707,1670,1607,1537,1508,1451,1421,1308,1188,1129,1088/cm.

$[\alpha]_D^{20} = -7.2^\circ$ ($CHCl_3, c=1.01, 28.5^\circ C$). mp.147-149 $^\circ C$.

No.1a - 99

CD_3OD 300MHz

1.04-1.98(14H,m),2.21(1H,m),2.10(2H,t,J=7.2Hz),2.95(1H,m),3.78(3H,s),3.86(3H,s),5.07-5.24(2H,m),7.19(2H,s),7.98(2H,d,J=8.7Hz),8.13(1H,d,J=8.7Hz).

IR(KBr):3354,3002,2950,2874,1656,1607,1570,1508,1452,1418,1314,1288,1185,1157,1127,1092/cm.

$[\alpha]_D^{20} = -20.5^\circ$ ($CH_3OH, c=1.00, 23.5^\circ C$).

No.1a - 100

$CDCl_3$ 300MHz

1.14-1.97(14H,m),2.19(1H,m),2.28(2H,t,J=7.4Hz),3.04(1H,m),3.69(3H,s),5.03(1H,d,J=8.9Hz),5.15-5.29(2H,m),7.68(2H,d,J=8.4Hz),7.87(1H,s),7.98(2H,d,J=8.4Hz).

IR($CHCl_3$):3286,3271,3025,3015,2955,2877,1755,1712,1608,1331,1162/cm.

$[\alpha]_D^{20} = -29.4^\circ$ ($CH_3OH, c=1.01, 25^\circ C$).

No.1a - 101

d_6 -DMSO

1.00-2.20(17H,m),2.84(1H,m),5.00-5.20(2H,m),7.78(2H,d,J=8.2Hz),7.84(1H,s),7.89-7.98(3H,m).

IR(KBr):3269,3068,3008,2952,2874,2768,1746,1707,1607,1322,1157 /cm.

$[\alpha]_D^{20} = -24.2^\circ$ ($CH_3OH, c=1.01, 25^\circ C$).

No.1a - 102

CD_3OD

1.00-2.25(17H,m),2.92(1H,s),3.64(3H,s),5.07-5.21(2H,m),7.53(1H,s),7.77(3H,d,J=8.6Hz),7.90(2H,d,J=8.6).

IR(KBr):3420,3277,3006,2952,2873,1730,1687,1620,1571,1488,1312,1156 /cm.

$[\alpha]_D^{20} = -27.3^\circ$ ($CH_3OH, c=0.51, 26^\circ C$), mp 230-232 $^\circ C$.

No.1a - 103

$CDCl_3$ 300MHz

0.94-1.98(14H,m),2.19(1H,m),2.28(2H,t,J=7.2Hz),3.04(1H,m),3.69(3H,s),5.11(1H,d,J=8.6Hz),5.15-5.28(2H,m),7.60(2H,d,J=8.4Hz),7.87(1H,s),7.98(2H,d,J=8.4Hz).

IR($CHCl_3$):3381,3021,2955,2876,1785,1605,1497,1411,1325,1231,1177 /cm.

$[\alpha]_D^{20} = +8.6^\circ$ ($CHCl_3, c=1.00, 23^\circ C$).

No.1 - 104

CDCl₃ 300MHz

0.94-1.98(14H,m), 2.21(1H,m), 2.31(2H,t,J=6.8Hz), 2.99(1H,m), 5.18-5.28(2H,m), 5.45(1H,d,J=6.6Hz), 7.51(2H,d,J=8.7Hz), 7.67(1H,s), 7.99(2H,d,J=8.7Hz).
IR(CHCl₃): 3382, 3222, 3028, 3019, 2957, 2876, 1736, 1709, 1604, 1412, 1322, 1301, 1288, 1179, 1162 /cm.

[α]_D²⁰ = +10.4° (CHCl₃, c=1.00, 23°C).

No.1a - 105

CDCl₃ 300MHz

0.92-1.98(14H,m), 2.17(1H,m), 2.26(2H,d,J=7.5Hz), 3.01(1H,m), 3.69(3H,s), 4.01(3H,s), 4.84(1H,d,J=6.3Hz), 5.14-5.30(2H,m), 7.71(2H,d,J=8.7Hz), 7.87(2H,d,J=8.7Hz), 8.09(1H,s).

IR(CHCl₃): 3385, 3284, 3025, 3015, 2954, 2877, 2821, 1730, 1598, 1459, 1438, 1403, 1341, 1160, 1052 /cm.

[α]_D²⁰ = +3.6° (CHCl₃, c=1.00, 26°C).

No.1a - 106

CDCl₃ 300MHz

0.92-2.08(14H,m), 2.14(1H,m), 2.34(2H,d,J=7.2Hz), 3.02(1H,m), 4.01(3H,s), 5.19(1H,d,J=6.9Hz), 5.23-5.32(2H,m), 7.71(2H,d,J=8.4Hz), 7.88(2H,d,J=8.4Hz), 8.09(1H,s).

IR(CHCl₃): 3510, 3384, 3268, 3028, 3021, 3014, 2957, 2877, 2821, 2667, 2621, 2666, 1707, 1598, 1459, 1404, 1341, 1324, 1180, 1052 /cm.

[α]_D²⁰ = +11.8° (CHCl₃, c=1.01, 25°C). mp 95-98°C

No.1a - 107

CDCl₃ 300MHz

0.93-1.97(14H,m), 1.84(3H,t, J=7.2Hz), 2.16(1H,m), 2.28(2H,d, J=7.4Hz), 3.01(1H,m), 3.68(3H,s), 4.26(2H,q, J=7.2Hz), 4.38(1H,d, J=6.6Hz), 5.15-5.29(2H,m), 7.71(2H,d, J=8.7Hz), 7.87(2H,d, J=8.7Hz), 8.09(1H,s).
IR(CHCl₃): 3385, 3282, 3025, 3026, 3015, 2954, 2877, 1729, 1599, 1480, 1458, 1438, 1403, 1338, 1161 /cm.
[α]_D²⁰ = +4.4° (CHCl₃, c=1.00, 25°C).

No.1a - 108

CDCl₃, 300MHz

0.90-2.04(14H,m), 1.84(3H,t, J=7.2Hz), 2.14(1H,m), 2.34(2H,d, J=7.1Hz), 3.01(1H,m), 4.27(2H,q, J=7.2Hz), 5.20(1H,d, J=6.6Hz), 5.21-5.35(2H,m), 7.71(2H,d, J=8.4Hz), 7.88(2H,d, J=8.4Hz), 8.10(1H,s).
IR(CHCl₃): 3514, 3384, 3270, 3025, 3015, 3016, 2957, 2877, 1708, 1599, 1458, 1403, 1324, 1324, 1160, 1050 /cm.
[α]_D²⁰ = +12.7° (CHCl₃, c=1.00, 25°C).

No.1a - 109

[α]_D²⁰ = +8.5° (CHCl₃, c=1.00, 25°C). mp 109.0-111.0°C

No.1a - 110

CDCl₃:CD₃OD(95:5)

0.92-2.06(14H,m), 2.20(1H,m), 2.30(2H,d, J=7.2Hz), 2.39(1H,m), 5.22-5.33(2H,m), 7.54-7.66(3H,m), 8.07(2H,d, J=9.0Hz), 8.12-8.20(2H,m), 8.29(2H,d, J=9.0Hz).
IR(Nujol): 3270, 2956, 2924, 2854, 1716, 1648, 1485, 1319, 1167 /cm.
[α]_D²⁰ = +17.0° (CHCl₃, c=1.00, 25°C). mp 168.5-169°C

No.1a - 111

[α]_D²⁰ = +2.6° (CHCl₃, c=1.00, 24°C). mp 120.0-121.0°C

No.1a - 112

CDCl₃, 300MHz

0.96-2.04(14H,m), 2.19(1H,m), 2.33(2H,d, J=7.1Hz), 3.07(1H,m), 5.28-5.31(2H,m), 5.33(1H,d, J=6.6Hz), 7.54-7.63(3H,m), 8.05(2H,d, J=8.4Hz), 8.18-8.23(2H,m), 8.41(2H,d, J=8.4Hz).
IR(CHCl₃): 3384, 3289, 3025, 3015, 2957, 2877, 1708, 1598, 1496, 1457, 1417, 1326, 1164 /cm.
[α]_D²⁰ = +12.2° (CHCl₃, c=1.00, 24°C). mp 163-164°C

No.1a - 113

[α]_D²⁰ = +22.1° (CHCl₃, c=1.05, 25°C). mp 90-92°C

No.1a - 114

[α]_D²⁰ = +2.2° (CHCl₃, c=1.02, 25°C).

No.1a - 115

CDCl₃, 300MHz

0.90-1.98(14H,m), 2.15-2.22(1H,m), 2.27(2H,t, J=7.2Hz), 2.35-2.04(1H,m), 3.68(3H,s), 4.04(2H,s), 4.88(1H,d, J=6.6Hz), 5.10-5.27(2H,m), 7.12-7.34(7H,m), 7.76-7.82(2H,m).
IR(CHCl₃): 3384, 3026, 2952, 1727, 1595, 1493, 1486, 1518, 1165, 1091, 890 /cm.
[α]_D²⁰ = 0°
[α]_D²⁰ = +4.9 ± 0.4° (CHCl₃, c=1.05, 23°C)

No.1a - 116

CDCl₃, 300MHz

0.90-2.10(14H,m), 2.10-2.18(1H,m), 2.32(2H,t, J=7.2Hz), 2.36-2.04(1H,m),

4.04(2H,s), 5.14(1H,d,J=6.6Hz), 5.18-5.25(2H,m), 7.12-7.34(7H,m), 7.76-7.82(2H,m).

IR(CHCl₃): 3280, 3020, 2950, 1709, 1407, 1318, 1154, 1091, 892/cm.

[α]_D²⁰ = +9.1 ± 0.5° (CHCl₃, c = 1.04, 23°C)

No. 1a - 117

CDCl₃, 300MHz

0.96-2.18(17H,m), 2.89-2.92(1H,m), 4.06(2H,s), 4.95-5.22(2H,m), 7.15-

7.42(7H,m), 7.75-7.81(2H,m).

IR(KBr): 3439, 3279, 2951, 2872, 1562, 1494, 1452, 1408, 1318, 1155, 1093, 1057/cm.

m.

[α]_D²⁰ = -16.3 ± 0.5° (CH₃OH, c = 1.06, 25°C)

No. 1a - 118

CDCl₃, 300MHz

0.95-1.70(15H,m), 1.80-2.00(5H,m), 2.30-2.40(2H,m), 2.92(1H,m), 4.06(2H,s), 4.

72(1H,d,J=6.8Hz), 5.00-5.23(3H,m), 7.18(2H,d,J=8.4Hz), 7.26-7.38(5H,m), 7.7

9(2H,d,J=8.1Hz).

IR(CHCl₃): 3376, 3020, 2948, 2888, 1716, 1596, 1492, 1452, 1407, 1318, 1155, 1105/cm.

cm.

[α]_D²⁰ = +2.4° (CHCl₃, c = 1.08, 24°C).

No. 1a - 119

CDCl₃, 300MHz

0.90-2.02(14H,m), 2.20(1H,m), 2.29(2H,t,J=7.2Hz), 3.00(1H,m), 3.68(3H,s), 4.8

6(1H,d,J=6.9Hz), 5.18-5.34(2H,m), 7.00-7.09(4H,m), 7.22(1H,m), 7.37-7.45(2H,

m), 7.79-7.88(2H,m).

IR(CHCl₃): 3276, 3018, 2946, 2868, 1727, 1582, 1486, 1321, 1248, 1151, 1093 /cm.

[α]_D²⁰ = +4.5° (CHCl₃, c = 1.05, 23.5°C).

No. 1a - 120

CDCl₃, 300MHz

1.00-2.00(14H,m), 2.18(2H,t,J=7.5Hz), 2.16(1H,m), 2.91(1H,m), 3.05-5.25(2H,

m), 7.04-7.11(4H,m), 7.18-7.25(1H,m), 7.38-7.48(2H,m), 7.80-7.87(2H,m).

IR(KBr): 3430, 3276, 3006, 2952, 2878, 1583, 1487, 1410, 1322, 1298, 1245, 1152, 1095 /cm.

[α]_D²⁰ = -8.8° (CH₃OH, c = 1.05, 25.0°C).

No. 1a - 121

CDCl₃, 300MHz

0.90-2.10(14H,m), 2.15(1H,m), 2.25(2H,t,J=7.2Hz), 3.01(1H,m), 5.20(1H,d,J=6.

9Hz), 5.22-5.35(2H,m), 7.00-7.09(4H,m), 7.18-7.25(1H,m), 7.37-7.45(2H,m), 7.7

9-7.85(2H,m).

IR(CHCl₃): 3280, 3020, 2948, 2868, 1708, 1582, 1486, 1409, 1321, 1296, 1248, 1151,

1093 /cm.

[α]_D²⁰ = +18.1° (CHCl₃, c = 1.04, 24.0°C).

No. 1a - 122

CDCl₃, 300MHz

0.90-2.00(14H,m), 2.28(1H,m), 2.28(2H,t,J=7.5Hz), 2.96(1H,m), 3.67(3H,s), 4.8

9(1H,d,J=6.6Hz), 5.18-5.32(2H,m), 5.22(1H,s), 5.98-7.40(5H,m), 7.80-7.38(2H,

m), 7.68-7.74(2H,m).

IR(CHCl₃): 3416, 3270, 3018, 2946, 2868, 1725, 1587, 1508, 1487, 1400, 1320, 1149,

1094 /cm.

[α]_D²⁰ = +6.2° (CHCl₃, c = 1.04, 25.0°C).

No. 1a - 123

CDCl₃, 300MHz

0.90-2.04(14H,m),2.18(1H,m),2.33(2H,t,J=7.2Hz),2.98(1H,m),3.04-5.35(8H,m),6.98-7.12(8H,m),7.12-7.20(2H,m),7.23-7.38(2H,m),7.66-7.74(2H,m).
IR(CHCl₃):3424,3270,3028,2982,2872,1708,1587,1508,1445,1399,1320,1148,1092 /cm.
[α]_D²⁰ = +20.9° (CHCl₃, c=1.06, 25.0°C).

No.1a - 1 2 4

CDCl₃, 300MHz

0.90-2.00(14H,m),2.18(1H,m),2.28(2H,t,J=7.2Hz),3.00(1H,m),3.14(3H,s),3.68(3H,s),4.56(2H,s),4.84(1H,d,J=6.8Hz),5.10-5.29(2H,m),7.16-7.26(4H,m),7.26-7.34(2H,m),7.78-7.84(2H,m).
IR(CHCl₃):3384,3028,2952,2874,1727,1598,1501,1485,1410,1370,1329,1172,1148,1091 /cm.
[α]_D²⁰ = +2.7° (CHCl₃, c=1.09, 23.0°C).

No.1a - 1 2 5

CDCl₃, 300MHz

0.90-2.00(14H,m),2.18(1H,m),2.28(2H,t,J=7.2Hz),2.29(3H,s),3.00(1H,m),3.68(3H,s),4.04(2H,s),4.80(1H,d,J=6.6Hz),5.11-5.29(2H,m),6.99-7.08(2H,m),7.12-7.19(2H,m),7.81(2H,d,J=8.1Hz),7.79(2H,d,J=8.1Hz).
IR(CHCl₃):3382,3280,3024,2950,2874,1780,1596,1504,1488,1407,1367,1318,1196,1156,1091 /cm.
[α]_D²⁰ = +2.9° (CHCl₃, c=1.06, 23.0°C).

No.1a - 1 2 6

CDCl₃, 300MHz

0.90-2.02(14H,m),2.14(1H,m),2.29(3H,s),2.32(3H,t,J=7.2Hz),3.01(1H,m),4.08(2H,s),5.10(1H,d,J=6.6Hz),5.16-5.30(2H,m),6.98-7.06(2H,m),7.11-7.18(2H,m),7.80(2H,d,J=8.1Hz),7.79(2H,d,J=8.1Hz).
IR(CHCl₃):3374,3280,3020,2948,2868,1749,1708,1596,1504,1407,1369,1317,1196,1155,1091 /cm.
[α]_D²⁰ = +10.0° (CHCl₃, c=1.09, 23.0°C).

No.1a - 1 2 7

CDCl₃, 300MHz

0.87-1.95(14H,m),2.18-2.22(3H,m),2.95(1H,m),3.69(3H,s),3.96(2H,s),4.79(1H,d,J=6.6Hz),4.97-5.17(2H,m),5.54(1H,s),6.75-6.89(2H,m),6.97-7.05(2H,m),7.25-7.33(2H,m),7.75-7.81(2H,m).
IR(CHCl₃):3382,3028,2950,2874,1722,1595,1511,1436,1407,1317,1257,1154,1090 /cm.
[α]_D²⁰ = -2.1° (CHCl₃, c=1.00, 21.5°C).

No.1a - 1 2 8

CDCl₃, 300MHz

0.85-2.02(14H,m),2.18(1H,m),2.31(2H,t,J=7.2Hz),2.96(1H,m),3.95(2H,s),5.05-5.27(2H,m),6.75-6.82(2H,m),6.96-7.04(2H,m),7.25-7.32(2H,m),7.74-7.81(2H,m).
IR(CHCl₃):3362,3020,2948,2868,1708,1596,1511,1407,1316,1242,1154,1091 /cm.
[α]_D²⁰ = +4.8° (CHCl₃, c=1.04, 22°C).

No.1a - 1 2 9

CDCl₃, 300MHz

0.89-1.98(14H,m),2.18(1H,m),2.27(2H,t,J=7.2Hz),2.99(1H,m),3.68(3H,s),3.79(3H,s),3.98(2H,s),4.81(1H,d,J=6.8Hz),5.10-5.27(2H,m),6.81-6.87(2H,m),7.03-7.10(3H,m),7.25-7.32(2H,m),7.75-7.82(2H,m).
IR(CHCl₃):3362,3276,3006,2950,2874,1728,1609,1509,1457,1436,1407,1316,1244,1164,1091,1038 /cm.

$[\alpha]_D^{25} = +19.3^\circ$ (CHCl_3 , $c=1.05$, 25°C).

No. 1a - 130

CDCl_3 , 300MHz

0.90-2.00(14H,m), 2.20(1H,m), 2.80(2H,t, $J=7.2\text{Hz}$), 2.98(1H,m), 3.59(3H,s), 4.81(1H,d, $J=6.6\text{Hz}$), 5.12-5.82(2H,m), 5.46(1H,brs), 6.84-7.01(6H,m), 7.76-7.88(2H,m)

IR(CHCl_3): 3380, 3284, 3024, 2952, 2874, 1724, 1585, 1504, 1488, 1486, 1321, 1296, 1149, 1091/ cm^{-1} .

$[\alpha]_D^{25} = +28.9^\circ$ (CHCl_3 , $c=1.01$, 25°C).

No. 1a - 131

CDCl_3 , 300MHz

0.92-2.10(14H,m), 2.18(1H,m), 2.34(2H,t, $J=6.9\text{Hz}$), 2.96(1H,m), 3.18-5.35(3H,m), 6.84-7.01(6H,m), 7.75-7.83(2H,m).

IR(CHCl_3): 3270, 3028, 2952, 2874, 1708, 1589, 1505, 1489, 1456, 1322, 1297, 1288, 1148, 1091/ cm^{-1} .

$[\alpha]_D^{25} = +7.7^\circ$ (CHCl_3 , $c=1.09$, 24°C).

No. 1a - 132

CDCl_3 , 300MHz

0.91-2.02(14H,m), 2.19(1H,m), 2.29(2H,t, $J=7.2\text{Hz}$), 2.99(1H,m), 3.68(3H,s), 4.83(3H,s), 4.82(1H,d, $J=6.6\text{Hz}$), 5.14-5.38(2H,m), 6.90-7.04(6H,m), 7.76-7.88(2H,m).

IR(CHCl_3): 3384, 3006, 2952, 2874, 1727, 1589, 1502, 1488, 1459, 1436, 1321, 1295, 1281, 1150, 1092, 1038/ cm^{-1} .

$[\alpha]_D^{25} = +3.1^\circ$ (CHCl_3 , $c=1.01$, 23°C).

No. 1a - 133

TLC Rf=0.21 (에틸아세테이트/n-헥산 = 1:1 (0.8% 아세트산.))

No. 1a - 134

CDCl_3 , 300MHz

0.97-2.10(14H,m), 2.20(1H,m), 2.38(2H,t, $J=6.9\text{Hz}$), 3.04(1H,m), 3.23-5.33(2H,m), 5.41(1H,d, $J=6.6\text{Hz}$), 7.02(1H,d, $J=9.0\text{Hz}$), 7.09-7.18(2H,m), 7.26-7.32(1H,m), 7.43-7.49(2H,m), 7.92(1H,d,d, $J=2.4$ 및 9.0Hz), 8.46(1H,d, $J=2.4\text{Hz}$).

IR(CHCl_3): 3284, 3270, 3020, 2958, 1708, 1610, 1587, 1537, 1479, 1362, 1271, 1252, 1167/ cm^{-1} .

$[\alpha]_D^{25} = +20.9^\circ$ (CHCl_3 , $c=0.51$, 22°C).

No. 1a - 135

CDCl_3 , 300MHz

0.96-2.02(14H,m), 2.21(1H,m), 2.29(2H,t, $J=7.2\text{Hz}$), 3.07(1H,m), 3.68(3H,s), 5.04(1H,d, $J=6.9\text{Hz}$), 5.16-5.33(2H,m), 7.48-7.55(2H,m), 7.64(1H,m), 7.76-7.82(2H,m), 7.88-7.94(2H,m), 7.98-8.04(2H,m).

IR(CHCl_3): 3284, 3282, 3026, 2952, 2874, 1727, 1662, 1596, 1448, 1398, 1316, 1274, 1162, 1090/ cm^{-1} .

$[\alpha]_D^{25} = +3.1^\circ$ (CHCl_3 , $c=1.03$, 22.0°C).

No. 1a - 136

CDCl_3 , 300MHz

0.95-2.05(14H,m), 2.19(1H,m), 2.34(2H,t, $J=7.2\text{Hz}$), 3.03(1H,m), 3.10-5.40(2H,m), 5.35(1H,d, $J=6.8\text{Hz}$), 7.45-7.58(2H,m), 7.64(1H,m), 7.74-7.84(2H,m), 7.84-7.95(2H,m), 7.95-8.06(2H,m).

IR(CHCl_3): 3260, 3018, 2950, 2870, 1708, 1662, 1595, 1446, 1398, 1316, 1274, 1162, 1090/ cm^{-1} .

$[\alpha]_D^{25} = +12.9^\circ$ (CHCl_3 , $c=1.05$, 21.5°C).

No.1a - 137

CDCl₃, 800MHz

0.97-2.04(14H,m),2.37(1H,m),2.31(2H,t,J=7.2Hz),2.07(1H,m),2.70(3H,s),5.15-5.30(3H,m),7.48-7.68(5H,m),7.96-8.02(2H,m).

IR(CHCl₃):3282,3080,2953,2875,1726,1446,1323,1154,1092 /cm.

[α]_D²⁰ = -13.1° (CHCl₃, c=1.03, 22.0°C).

No.1a - 138

CDCl₃, 800MHz

0.95-2.04(14H,m),2.25(1H,m),2.35(2H,t,J=7.2Hz),2.08(1H,m),5.15-5.34(3H,m),5.41(1H,d,J=6.6Hz),7.48-7.68(5H,m),7.98-8.03(2H,m).

IR(CHCl₃):3370,3242,3023,2950,2870,1707,1445,1406,1323,1154,1099 /cm.

[α]_D²⁰ = -0.6° (CHCl₃, c=1.06, 21.5°C) [α]_m²⁰ = +30.7° (CHCl₃, c=1.06, 21.5°C).

No.1a - 139

CDCl₃, 800MHz

0.92-2.19(14H,m),2.27-2.34(3H,m),2.28(1H,m),3.45(3H,s),4.28(2H,s),4.37(1H,d,J=7.4Hz),5.34-5.50(3H,m),7.37-7.62(5H,m).

IR(CHCl₃):3389,3294,3028,3015,2954,2877,1730,1600,1488,1325,1161,1129 /cm.

[α]_D²⁰ = -24.8° (CHCl₃, c=1.01, 24°C).

No.1a - 140

CDCl₃, 300MHz

0.92-2.32(15H,m),2.34(2H,t,J=7.1Hz),2.24(1H,m),4.29(2H,s),4.31(1H,d,J=7.4Hz),5.32-5.52(3H,m),7.36-7.62(5H,m).

IR(CHCl₃):3510,3388,3251,3031,3015,2956,2877,2868,1708,1601,1488,1318,1151,1129 /cm.

[α]_D²⁰ = -24.8° (CHCl₃, c=1.02, 25°C).

No.1a - 1 4 1

CDCl₃, 800MHz

0.82-2.19(15H,m), 2.82(2H,t,J=7.2Hz), 3.26(1H,m), 3.66(3H,s), 4.31(2H,s), 4.48
(1H,d,J=7.4Hz), 5.33-5.49(2H,m), 7.42-7.80(8H,m).

IR(CHCl₃): 3388, 3285, 3018, 2955, 2877, 2225, 1730, 1697, 1479, 1320, 1152, 1129
/cm.

[α]_D²⁰ = -20.1° (CHCl₃, c=0.98, 25°C).

No.1a - 1 4 2

CDCl₃, 800MHz

0.82-2.22(15H,m), 2.85(2H,t,J=6.8Hz), 3.26(1H,m), 4.32(2H,s), 4.86(1H,d,J=7.
4Hz), 5.33-5.58(2H,m), 7.48-7.80(8H,m).

IR(CHCl₃): 3512, 3368, 3258, 3031, 3023, 3014, 2956, 2877, 2225, 1708, 1697, 147
9, 1319, 1151, 1128 /cm.

[α]_D²⁰ = -19.8° (CHCl₃, c=1.09, 23°C).

No.1a - 1 4 3

CDCl₃, 800MHz

1.00-1.93(14H,m), 2.17(1H,m), 2.27(2H,t,J=7.2Hz), 3.07(1H,m), 5.17-5.22(2H,
m), 5.36(1H,d,J=6.9Hz), 7.77(1H,d,J=9.0Hz), 8.11-8.17(2H,m), 8.36(1H,d,d,J=2.1
H, 9.0Hz), 8.51(1H,d,J=1.8Hz), 8.65(1H,d,J=2.1Hz).

IR(CHCl₃): 3382, 3266, 3026, 2954, 2874, 1708, 1682, 1685, 1528, 1458, 1419, 1345,
1158/cm.

[α]_D²⁰ = +7.6° (CHCl₃, c=1.04, 22°C).

No.1a - 1 4 4

CDCl₃, 800MHz

0.95-1.90(14H,m), 2.17(1H,m), 2.25(2H,t,J=7.5Hz), 3.02(1H,m), 5.09(1H,d,J=6.

8Ha), 5.15-5.21(2H,m), 6.72(1H,d,J=8.4Hz), 6.85(1H,s), 7.54(1H,d,J=8.4Hz), 7.72(1H,d,J=9.0Hz), 7.83(1H,d,d,J=1.8 且 9.0Hz), 8.52(1H,d,J=1.6Hz).
IR(CHCl₃): 3380, 3260, 3022, 2948, 2888, 2852, 1709, 1688, 1460, 1425, 1312, 1291, 1285, 1148, 1120/cm.
[α]_D²⁰ = +12.9° (CHCl₃, c=1.02, 22.5°C).

No.1a - 1 4 5

CDCl₃, 300MHz
0.97-1.90(14H,m), 2.15(1H,m), 2.27(2H,t,J=6.5Hz), 2.02(1H,m), 3.08(6H,s), 5.12(1H,d,J=8.8Hz), 5.19-5.23(2H,m), 6.78-6.84(2H,m), 7.53(1H,d,J=8.7Hz), 7.76-7.83(2H,m), 8.30(1H,d,J=1.8Hz).
IR(CHCl₃): 3272, 3030, 2950, 2874, 1708, 1685, 1601, 1511, 1457, 1425, 1357, 1328, 1151, 1124/cm.
[α]_D²⁰ = +6.3° (CHCl₃, c=1.04, 23°C).

No.1a - 1 4 6

CDCl₃, 300MHz
0.95-2.00(14H,m), 2.16(1H,m), 2.29(2H,t,J=7.2Hz), 3.05(1H,m), 4.10(3H,s), 5.13-5.28(2H,m), 5.88(1H,d,J=8.9Hz), 7.67-7.74(2H,m), 8.08(1H,d,d,J=1.8 且 9.0Hz), 8.11(1H,s), 8.61(1H,d,J=1.8Hz).
IR(CHCl₃): 3280, 3020, 2948, 2888, 1708, 1639, 1606, 1528, 1470, 1465, 1424, 1349, 1311, 1288, 1174, 1149, 1120, 1079, 1060, 1022/cm.
[α]_D²⁰ = +7.8° (CHCl₃, c=1.00, 23°C).

No.1a - 1 4 7

CDCl₃, 300MHz
0.92-1.92(14H,m), 2.17(1H,m), 2.25(2H,t,J=7.2Hz), 3.01(1H,m), 3.97(3H,s), 5.10-5.27(5H,m), 6.92(1H,s), 7.29(1H,s), 7.52(1H,d,J=8.7Hz), 7.82(1H,d,d,J=2.1 且 8.7Hz), 8.88(1H,d,J=2.1Hz).
IR(CHCl₃): 3380, 3264, 3002, 2950, 2888, 1708, 1634, 1476, 1452, 1426, 1317, 1284, 1218, 1169, 1147, 1115, 1088, 1031/cm.
[α]_D²⁰ = +5.6° (CHCl₃, c=1.02, 23°C).

No.1a - 1 4 8

CDCl₃, 300MHz
0.90-1.98(14H,m), 2.15(1H,m), 2.28(2H,t,J=6.5Hz), 2.91(6H,s), 3.03(1H,m), 4.01(3H,s), 5.15-5.26(3H,m), 7.19(1H,s), 7.39(1H,s), 7.59(1H,d,J=8.7Hz), 7.87(1H,d,d,J=2.1 且 8.7Hz), 8.40(1H,d,J=2.1Hz).
IR(CHCl₃): 3284, 3266, 2956, 1709, 1632, 1602, 1495, 1478, 1468, 1480, 1317, 1231, 1148, 1121/cm.
[α]_D²⁰ = +11.2° (CHCl₃, c=1.01, 23°C).

No.1a - 1 4 9

CDCl₃, 300MHz
0.99-1.90(14H,m), 2.17(1H,m), 2.28(2H,t,J=7.2Hz), 3.00(1H,m), 5.13-5.19(2H,m), 5.48(1H,d,J=6.0Hz), 7.02(1H,d,d,J=2.4 且 9.0Hz), 7.39-7.41(2H,m), 7.58(1H,d,J=8.7Hz), 7.98(1H,d,d,J=1.8 且 8.7Hz), 8.45(1H,d,J=1.8Hz).
IR(CHCl₃): 3270, 3020, 2948, 2868, 1709, 1601, 1478, 1448, 1419, 1315, 1147, 1120/cm.
[α]_D²⁰ = -11.4° (CHCl₃, c=1.01, 23°C).

No.1a - 1 5 0

CDCl₃, 300MHz
0.97-1.88(14H,m), 2.12-2.31(3H,m), 2.38(3H,s), 3.01(1H,m), 5.14-5.19(2H,m), 5.36(1H,d,J=6.6Hz), 7.24(1H,d,d,J=2.4 且 9.0Hz), 7.59(1H,d,J=6.3Hz), 7.66(1H,d,J=8.7Hz), 7.72(1H,d,J=2.4Hz), 8.01(1H,d,d,J=1.8 且 8.7Hz), 8.49(1H,d,J=1.8Hz).
IR(CHCl₃): 3470, 3274, 3250, 3016, 2950, 2868, 1709, 1474, 1444, 1412, 1370, 1319,

1886, 1162, 1145, 1118 cm.

$[\alpha]_D^{25} +4.9^\circ$ (CHCl₃, c=1.00, 24°C).

No. 1a - 1 5 1

CDCl₃, 800MHz

0.97-1.89(14H,m), 2.17(1H,m), 2.25(2H,t,J=7.2Hz), 3.03(1H,m), 3.22(3H,s), 5.15-5.20(2H,m), 5.32(1H,d,J=6.6Hz), 7.11(1H,d,d,J=2.4 Hz 9.3Hz), 7.45(1H,d,J=2.4Hz), 7.50(1H,d,J=9.8Hz), 7.62(1H,d,J=8.7Hz), 7.97(1H,d,d,J=2.1 Hz 8.7Hz), 8.50(1H,d,J=2.1Hz).

IR(CHCl₃): 3280, 3018, 2948, 1708, 1482, 1454, 1422, 1314, 1287, 1268, 1188, 1169, 1147 cm.

$[\alpha]_D^{25} +4.9^\circ$ (CHCl₃, c=1.01, 23.5°C).

No. 1a - 1 5 2

CDCl₃, 300MHz

0.98-2.04(14H,m), 2.15(1H,m), 2.30(2H,t,J=8.6Hz), 3.04(1H,m), 5.17-5.29(3H,m), 7.41(1H,d,d,J=1.5 Hz 8.1Hz), 7.64-7.68(3H,m), 7.92(1H,d,J=3.4Hz), 8.00(1H,d,d,J=1.8 Hz 8.4Hz), 8.49(1H,d,J=1.8Hz).

IR(CHCl₃): 3266, 3028, 2952, 2872, 1707, 1629, 1591, 1486, 1416, 1318, 1275, 1150 cm.

$[\alpha]_D^{25} +3.2^\circ$ (CHCl₃, c=1.04, 23°C).

No. 1a - 1 5 3

CDCl₃, 800MHz

0.97-1.88(14H,m), 2.16(1H,m), 2.26(2H,t,J=7.2Hz), 3.03(1H,m), 4.64-4.65(2H,m), 5.16-5.50(5H,m), 5.13(1H,m), 7.14(1H,d,d,J=2.7 Hz 9.0Hz), 7.46-7.52(2H,m), 7.63(1H,d,J=8.7Hz), 7.97(1H,d,d,J=1.8 Hz 8.7Hz), 8.49(1H,d,J=1.8Hz).

IR(CHCl₃): 3374, 3260, 3020, 2948, 2862, 1708, 1699, 1478, 1446, 1414, 1314, 1284, 1262, 1184, 1148, 1120 cm.

$[\alpha]_D^{25} +5.3^\circ$ (CHCl₃, c=1.00, 23°C).

No. 1a - 1 5 4

CDCl₃, 800MHz

0.99-2.00(15H,m), 2.26(2H,t,J=7.2Hz), 3.03(1H,m), 4.07(3H,s), 5.25-5.27(2H,m), 5.36(1H,d,J=7.2Hz), 7.20(1H,s), 7.36-7.48(3H,m), 7.55-7.58(1H,m), 7.91-7.93(1H,m), 8.52(1H,s).

IR(CHCl₃): 3362, 3257, 3020, 2948, 2865, 1708, 1637, 1602, 1579, 1488, 1467, 1437, 1418, 1346, 1318, 1301, 1278, 1182, 1104 cm.

$[\alpha]_D^{25} +19.4^\circ$ (CHCl₃, c=1.01, 25°C).

mp. 88-90°C

No. 1a - 1 5 5

CDCl₃, 800MHz

0.92-2.02(14H,m), 2.16(1H,m), 2.31(2H,t,J=7.2Hz), 3.01(1H,m), 4.10(2H,s), 5.10(1H,d,J=6.6Hz), 5.15-5.35(2H,m), 7.04-7.26(5H,m), 7.67-7.76(2H,m).

IR(CHCl₃): 3286, 3028, 2952, 2872, 1708, 1699, 1574, 1478, 1457, 1418, 1301, 1268, 1147, 1124, 1101, 1080 cm.

$[\alpha]_{25} +33.4^\circ$ (CHCl₃, c=1.00, 23°C).

No. 1a - 1 5 6

CDCl₃, 800MHz

0.91-2.21(15H,m), 2.33(2H,t,J=6.9Hz), 3.01(1H,m), 5.11(1H,d,J=6.6Hz), 5.27-5.35(2H,m), 5.35-5.96(5H,m), 7.35(1H,d,J=2.1Hz), 7.42(1H,d,d,J=2.1 Hz 8.7Hz).

IR(CHCl₃): 3384, 3268, 2957, 1708, 1637, 1489, 1462, 1418, 1290, 1222, 1151, 1122 cm.

$[\alpha]_D^{25} +6.4^\circ$ (CHCl₃, c=1.00, 23°C).

No. 1a - 1 5 7

CDCl₃, 300MHz
0.97-1.91(14H,m), 2.18(1H,m), 2.28(2H,t,J=8.9Hz), 2.04(1H,m), 5.18-5.28(2H,m), 7.52-7.64(2H,m), 7.88-8.00(2H,m), 8.25(1H,m), 8.69(1H,m).
IR(CHCl₃): 3382, 3268, 2952, 2874, 1707, 1457, 1425, 1409, 1318, 1152/cm.
[α]_D²⁰ = +4.4° (CHCl₃, c=1.02, 22°C).

No.1a - 158
CDCl₃, 300MHz
1.02-1.97(14H,m), 2.30(1H,m), 2.39(2H,t,J=7.2Hz), 2.06(1H,m), 5.19-5.24(2H,m), 5.58(1H,d,J=8.6Hz), 7.62(1H,m), 7.73(1H,m), 7.86-7.91(2H,m), 7.96(1H,d,J=7.5Hz), 8.04(1H,d,d,J=1.5 Hz, 8.1Hz), 8.34(1H,d,J=1.2Hz).
IR(CHCl₃): 3490, 3280, 3020, 2950, 2870, 1707, 1466, 1398, 1312, 1155/cm.
[α]_D²⁰ = -8.8° (CHCl₃, c=1.00, 22°C).

No.1a - 159
CDCl₃, 300MHz
0.92-1.88(14H,m), 2.18(1H,m), 2.24(2H,m), 2.02(1H,m), 2.90(2H,m), 5.12-5.28(2H,m), 7.29-7.58(4H,m), 7.97(1H,d,d,J=1.8 Hz, 7.5Hz), 8.13(1H,d,J=7.5Hz), 8.64(1H,d,J=1.8Hz).
IR(CHCl₃): 3382, 3266, 3018, 2956, 1708, 1629, 1594, 1476, 1467, 1325, 1245, 1227, 1158, 1146/cm.
[α]_D²⁰ = +14.6° (CHCl₃, c=1.00, 22°C).

No.1a - 160
CDCl₃, 300MHz
0.92-1.88(14H,m), 2.18-2.24(2H,m), 2.00(1H,m), 5.08-5.21(2H,m), 7.28-7.33(1H,m), 7.47-7.51(2H,m), 7.90(1H,d,d,J=1.5 Hz, 7.5Hz), 8.10(1H,d,J=7.5Hz), 8.68-8.64(2H,m).
IR(CHCl₃): 3465, 3380, 3275, 3020, 2957, 2876, 1708, 1627, 1604, 1495, 1473, 1457, 1323, 1240, 1222, 1156, 1149/cm.
[α]_D²⁰ = +8.2° (CHCl₃, c=1.01, 22°C).

No.1a - 161
CDCl₃, 300MHz
0.98-1.88(14H,m), 2.17(1H,m), 2.24(2H,t,J=7.2Hz), 2.05(1H,m), 5.16-5.20(2H,m), 5.35(1H,d,J=8.6Hz), 7.40(1H,m), 7.55(1H,m), 7.83(1H,d,J=8.1Hz), 7.89(1H,d,d,J=1.5 Hz, 8.1Hz), 8.01(1H,m), 8.06(1H,d,J=8.1Hz), 8.12(1H,d,J=1.5Hz).
IR(CHCl₃): 3478, 3266, 3028, 2952, 2874, 1708, 1454, 1417, 1323, 1196, 1145/cm.
[α]_D²⁰ = +21.9° (CHCl₃, c=1.01, 22°C).

No.1a - 162
CDCl₃, 300MHz
0.96-1.98(14H,m), 2.02(1H,m), 2.25(2H,t,J=7.2Hz), 2.05(1H,m), 4.10(2H,s), 5.14-5.26(2H,m), 5.41(1H,d,J=7.2Hz), 7.35-7.42(1H,m), 7.51-7.64(2H,m), 7.94-8.00(1H,m), 8.16(1H,s).
IR(CHCl₃): 3368, 3274, 3028, 2952, 2874, 1708, 1628, 1583, 1465, 1452, 1438, 1418, 1315, 1151, 1103, 1058, 1024/cm.
[α]_D²⁰ = +15.1° (CHCl₃, c=1.01, 22°C). mp. 108-110°C

No.1a - 163
d₆-DMSO 300MHz
0.97-1.84(14H,m), 1.92(1H,m), 2.04(2H,t,J=7.5Hz), 2.90(1H,m), 5.08-5.23(2H,m), 7.32(1H,s), 7.38-7.61(2H,m), 7.62(1H,s), 7.66-7.71(1H,m), 7.93(1H,s), 8.14-8.17(1H,m), 10.7(1H,s), 11.9(1H,s).
IR(KBr): 3350, 3295, 2952, 2874, 1707, 1626, 1601, 1466, 1431, 1389, 1315, 1251, 1174, 1146, 1106/cm.
[α]_D²⁰ = -25.3° (CH₃OH, c=1.01, 25°C). mp. 159-162°C

No.1a - 1 5 4

CDCl₃, 300MHz

0.98-1.96(17H,m), 2.05(1H,m), 2.26(2H,t,J=7.2Hz), 3.07(1H,m), 4.32(2H,q,J=7.2Hz), 5.19-5.23(2H,m), 5.31(1H,d,J=7.8Hz), 7.33(1H,m), 7.41-7.62(3H,m), 7.95(1H,m), 8.15(1H,s).

IR(CHCl₃): 3380, 3018, 2948, 2870, 1709, 1632, 1457, 1446, 1425, 1394, 1314, 1176, 1152, 1105/cm.

[α]_D²⁰ = +12.7° (CHCl₃, c=1.02, 25°C). mp. 106-109°C

No.1a - 1 5 5

CDCl₃, 300MHz

0.95-1.98(16H,m), 2.26(2H,t,J=7.5Hz), 3.04(1H,m), 4.15(3H,s), 5.20-5.26(2H,m), 5.34(1H,d,J=8.9Hz), 7.41-7.47(1H,m), 7.65-7.68(2H,m), 7.89-7.92(1H,m), 8.32(1H,s).

IR(CHCl₃): 3388, 3087, 3022, 2957, 1708, 1632, 1528, 1468, 1408, 1384, 1246, 1208, 1227, 1212, 1205, 1167/cm.

[α]_D²⁰ = +19.6° (CHCl₃, c=1.01, 25°C).

No.1a - 1 5 6

CDCl₃, 300MHz

0.97-2.02(16H,m), 2.27(2H,t,J=6.9Hz), 3.07(1H,m), 4.14(3H,s), 5.21-5.27(2H,m), 5.47(1H,d,J=8.9Hz), 7.64(1H,s), 7.72(1H,d,d,J=0.6 & 9.0Hz), 8.25(1H,s), 8.47(1H,d,d,J=2.4 & 9.0Hz), 8.94(1H,d,d,J=0.6 & 2.4Hz).

IR(CHCl₃): 3273, 2957, 1708, 1639, 1587, 1528, 1467, 1428, 1415, 1345, 1231, 1184, 1155/cm.

[α]_D²⁰ = +14.4° (CHCl₃, c=0.50, 25°C)

No.1a - 1 5 7

CDCl₃, 300MHz

0.92-2.00(14H,m), 2.15(1H,m), 2.27(2H,t,J=7.2Hz), 3.04(1H,m), 3.97(2H,s), 5.15-5.20(3H,m), 7.35-7.47(2H,m), 7.55-7.63(1H,m), 7.80-7.96(3H,m), 8.05(1H,d,J=0.8Hz).

IR(CHCl₃): 3280, 3020, 2948, 2868, 1707, 1451, 1413, 1319, 1172, 1144, 1101, 1071/cm.

[α]_D²⁰ = +18.2° (CHCl₃, c=1.04, 22°C).

No.1a - 1 5 8

CDCl₃, 300MHz

0.90-1.88(14H,m), 2.16(1H,m), 2.25(2H,t,J=6.9Hz), 3.00(1H,m), 5.00-5.19(2H,m), 5.35(1H,d,J=6.6Hz), 7.25-7.30(1H,m), 7.46-7.50(2H,m), 7.73(1H,d,d,J=1.5 & 8.1Hz), 8.08-8.14(3H,m), 8.93(1H,s).

IR(CHCl₃): 3486, 3380, 3276, 3016, 2957, 1708, 1630, 1498, 1458, 1324, 1241, 1150/cm.

[α]_D²⁰ = +18.0° (CHCl₃, c=1.00, 22°C).

No.1a - 1 5 9

CDCl₃, 300MHz

0.87-1.86(14H,m), 2.15(1H,m), 2.25(2H,t,J=6.9Hz), 2.98(1H,m), 3.89(2H,s), 5.00-5.22(2H,m), 5.27(1H,d,J=6.9Hz), 6.68(1H,d,d,J=2.1 & 15.4Hz), 6.94(1H,d,J=2.1Hz), 7.89(1H,d,d,J=1.5 & 7.8Hz), 7.92-8.01(3H,m), 8.83(1H,s).

IR(CHCl₃): 3465, 3378, 3278, 3022, 2957, 1708, 1630, 1609, 1569, 1459, 1433, 1314, 1281, 1229, 1151/cm.

[α]_D²⁰ = +19.3° (CHCl₃, c=1.01, 21°C).

No.1a - 1 7 0

CDCl₃, 300MHz

0.88-2.25(17H,m), 3.04(1H,m), 3.84(3H,s), 3.96(3H,s), 5.06-5.26(3H,m), 6.87-6.93(2H,m), 7.69(1H,d,d,J=1.6 & 8.2Hz), 7.93-8.06(3H,m).

IR(CHCl₃): 3028, 2957, 1708, 1630, 1601, 1480, 1331, 1243, 1224, 1152/cm.
[α]_D²⁰ = +17.3° (CHCl₃, c=1.00, 25°C).

No. 1a - 171

CDCl₃, 300MHz

0.95-2.00(14H, m), 2.16-2.32(3H, m), 2.66(2H, s), 3.14(1H, m), 3.68(2H, s), 5.09(1H, d, J=6.8Hz), 5.10-5.25(2H, m), 7.45(1H, d, d, J=1.8 Hz, 8.6Hz), 7.75-7.84(2H, m).
IR(CHCl₃): 2974, 3018, 2948, 2868, 1725, 1585, 1518, 1486, 1340, 1278, 1153, 1112/cm.

[α]_D²⁰ = -14.7° (CHCl₃, c=1.07, 25.0°C).

No. 1a - 172

CDCl₃, 300MHz

0.97-2.02(14H, m), 2.23(1H, m), 2.28(2H, t, J=7.2Hz), 2.66(2H, s), 3.14(1H, m), 5.12-5.22(2H, m), 5.41(1H, d, J=7.2Hz), 7.46(1H, d, d, J=2.1 Hz, 8.7Hz), 7.78(1H, d, J=8.7Hz), 7.78(1H, d, J=2.1Hz).
IR(CHCl₃): 3372, 3250, 3022, 2950, 2868, 1707, 1514, 1419, 1386, 1279, 1164, 1112/cm.

[α]_D²⁰ = -4.1° (CHCl₃, c=1.08, 28.0°C) mp. 141-143°C

No. 1a - 173

CDCl₃, 300MHz

1.15-2.42(17H, m), 2.91(1H, m), 3.15(1H, d, J=4.2Hz), 5.25-5.40(2H, m), 7.85(1H, t, J=7.2Hz), 8.00(1H, t, J=8.1Hz), 8.15-8.30(2H, m), 8.67(1H, d, J=8.1Hz), 8.73(1H, d, J=8.1Hz), 8.83(1H, s), 9.48(1H, s).
IR(KBr): 3422, 3269, 3046, 2952, 2871, 1711, 1617, 1447, 1333, 1243, 1181, 1146/cm.

[α]_D²⁰ = -41.0° (CH₃OH, c=1.01, 23°C).

No. 1a - 174

CDCl₃+d₆-DMSO 300MHz

1.00-1.92(14H, m), 2.20(2H, t, J=8.6Hz), 2.35(1H, m), 2.92(1H, m), 5.05-5.32(2H, m), 6.68(1H, d, J=5.4Hz), 7.77-7.92(2H, m), 8.31(1H, d, d, J=1.8 Hz, 8.7Hz), 8.59(1H, d, J=8.7Hz), 8.78(1H, d, J=8.7Hz), 9.01(1H, s), 9.55(1H, d, J=1.8Hz).
IR(KBr): 3433, 3252, 2952, 2871, 1696, 1578, 1423, 1335, 1308, 1219, 1185, 1160, 1106/cm.

[α]_D²⁰ = -19.3° (DMSO, c=0.50, 23°C).

No. 1a - 175

CDCl₃, 300MHz

0.96-1.87(14H, m), 2.20-2.25(2H, m), 2.95(1H, m), 3.66(2H, s), 4.74(1H, d, J=6.6Hz), 5.10-5.12(2H, m), 6.88(1H, d, J=1.2Hz), 7.37-7.50(2H, m), 7.56(1H, dd, J=2.7, 1.6Hz), 7.88-7.77(2H, m), 8.06(1H, s), 9.44(1H, dd, J=1.2Hz).
IR(CHCl₃): 3462, 3374, 3036, 3006, 2952, 2872, 1724, 1610, 1530, 1464, 1462, 1258, 1309, 1147.

[α]_D²⁰ = +16.4° (CHCl₃, c=1.05, 26°C) mp. 180-182°C.

No. 1a - 176

CDCl₃+CD₃OD 300MHz

1.00-2.02(14H, m), 2.22(1H, m), 2.29(2H, t, J=6.9Hz), 2.88(1H, m), 5.15-5.36(2H, m), 6.87(1H, s), 7.28-7.87(4H, m), 7.69(1H, d, J=6.4Hz), 7.75-7.78(2H, m), 7.99(1H, s).

IR(KBr): 3254, 2944, 1704, 1484, 1453, 1358, 1305, 1147.

[α]_D²⁰ = +13.0° (CH₃OH, c=1.02, 24°C) mp. 160-161°C

No. 1a - 177

CDCl₃, 300MHz

.96-1.88(14H, m), 1.88-2.26(2H, m), 2.94(1H, m), 3.67(2H, s), 3.67(2H, s), 4.67(1

H, brs), 5.08-5.14 (2H, m), 6.77 (1H, d, J=1.5 Hz), 6.99-7.03 (2H, m), 7.53-7.57 (1H, m), 7.65-7.70 (3H, m), 8.00 (1H, s), 9.27 (1H, brs).
IR(CHCl₃): 3426, 3278, 3006, 2952, 1724, 1610, 1495, 1438, 1357, 1308, 1282, 1249, 1177, 1147/cm.
[α]_D²⁰ = +18.1° (CHCl₃, c=1.02, 22°C).

No. 1a - 178

CDCl₃+CD₃OD 300MHz
1.96-1.91 (14H, m), 2.19 (1H, m), 2.27 (3H, t, J=6.0 Hz), 2.85 (1H, m), 3.87 (3H, s), 5.1
6-5.23 (2H, m), 6.99-7.03 (2H, m), 7.41 (1H, m), 7.64-7.78 (3H, m), 7.92 (1H, m).
IR(CHCl₃): 3388, 3281, 3004, 2954, 2878, 1705, 1611, 1498, 1455, 1438, 1304, 1286,
1253, 1180, 1149, 1128/cm.
[α]_D²⁰ = +14.6° (CHCl₃, c=1.02, 22°C).

No. 1a - 179

CDCl₃+CD₃OD 300MHz
0.96-1.87 (14H, m), 2.15-2.23 (3H, m), 2.92 (1H, m), 3.85 (3H, s), 6.10-6.16 (2H, m), 6.
90-6.98 (2H, m), 7.50 (1H, m), 7.60-7.65 (3H, m), 7.91 (1H, d, J=0.9 Hz).
IR(CHCl₃): 3369, 3270, 2950, 2878, 1719, 1612, 1498, 1456, 1440, 1359, 1306, 1269,
1219, 1146, 1127/cm.
[α]_D²⁰ = +18.1° (CH₃OH, c=1.00, 22°C).

No. 1a - 180

CDCl₃+CD₃OD 300MHz
1.03-1.86 (14H, m), 2.05-2.17 (3H, m), 2.91 (1H, m), 5.06-5.10 (2H, m), 6.76 (1H, m),
6.86-6.90 (2H, m), 7.48 (1H, m), 7.81-7.69 (3H, m), 7.89 (1H, m).
IR(CHCl₃): 3380, 3269, 2954, 2878, 1708, 1612, 1497, 1457, 1360, 1306, 1272, 1230,
1176, 1148, 1126/cm.
[α]_D²⁰ = +20.3° (CH₃OH, c=1.00, 22°C).

No. 1a - 181

CDCl₃ 300MHz
0.97-1.96 (14H, m), 2.15 (1H, m), 2.29 (2H, t, J=6.9 Hz), 3.05 (1H, m), 3.81 (3H, s), 5.0
8 (1H, d, J=6.9 Hz), 5.23-5.25 (2H, m), 6.62 (1H, s), 7.47-7.54 (5H, m), 7.59 (1H, m), 7.
70 (1H, m), 7.97 (1H, m).
IR(CHCl₃): 3380, 3280, 3020, 2946, 2868, 1708, 1466, 1388, 1328, 1149/cm.
[α]_D²⁰ = +32.9° (CHCl₃, c=1.07, 22°C).

No. 1a - 182

CDCl₃ 300MHz
0.94-1.90 (14H, m), 2.25 (2H, t, J=7.5 Hz), 2.30 (1H, m), 2.98 (1H, m), 3.70 (3H, s), 4.8
8 (1H, d, J=6.8 Hz), 5.13-5.16 (2H, m), 6.95 (1H, d, J=1.6 Hz), 7.11-7.23 (2H, m), 7.49 (1H, d, J=8.1 Hz), 7.65 (1H, d, J=8.1 Hz), 7.79-7.93 (4H, m), 8.08 (1H, br).
IR(CHCl₃): 3458, 3372, 3020, 3002, 2946, 2868, 1719, 1598, 1452, 1422, 1321, 1300,
1157/cm.
[α]_D²⁰ = -6.8° (CHCl₃, c=1.00), mp 150-151°C

No. 1a - 183

CDCl₃ 300MHz
0.95-1.94 (14H, m), 2.26 (1H, m), 2.28 (2H, t, J=7.5 Hz), 3.00 (1H, m), 5.16-5.19 (2H, m),
5.32 (1H, d, J=7.2 Hz), 6.98 (1H, d, J=1.2 Hz), 7.13 (1H, m), 7.22 (1H, dd, J=7.8, 6.6 Hz), 7.42 (1H, d, J=7.8 Hz), 7.68 (1H, d, J=7.8 Hz), 7.76 (2H, d, J=8.4 Hz), 7.90 (2H, d, J=8.4 Hz), 8.95 (1H, br).
IR(CHCl₃): 3458, 3274, 3260, 3020, 3002, 2948, 2868, 1708, 1598, 1452, 1422, 130
1, 1156/cm.
[α]_D²⁰ = +17.9° (CHCl₃, c=1.01, 22°C).

No. 1a - 184

CDCl₃, 300MHz

0.92-2.09(14H,m), 2.20(1H,m), 2.24(2H,t, J=6.5Hz), 3.05(1H,m), 5.20-5.38(2H,m), 7.29-7.44(2H,m), 7.61-7.66(1H,m), 7.80-7.84(1H,m), 8.05(2H,d, J=8.5Hz), 8.40(2H,d, J=8.5Hz).

IR(CHCl₃): 2984, 2971, 3019, 2958, 1709, 1615, 1599, 1551, 1458, 1405, 1344, 1326, 1245, 1168/cm.

[α]_D²⁰ = +18.5° (CHCl₃, c=1.00, 21°C).

No.1a - 185

CDCl₃, 300MHz

0.89-2.20(16H,m), 2.26(2H,d, J=2.1 Hz), 2.28(1H,m), 3.08(1H,d, J=6.5Hz), 5.09-5.24(2H,m), 6.90(1H,d, J=1.2Hz), 7.22-7.48(4H,m), 7.64-7.72(2H,m), 8.20(1H,d, J=1.2Hz), 9.00(1H,s).

IR(CHCl₃): 2984, 2975, 3275, 3022, 2956, 1707, 1605, 1490, 1449, 1356, 1322, 1219, 1147, 1131/cm.

[α]_D²⁰ = +21.6° (CHCl₃, c=1.01, 23°C).

No.1a - 186

CDCl₃, 300MHz

1.26-2.24(14H,m), 2.21(2H,t, J=7.4Hz), 2.49(1H,brs), 2.87(1H,m), 3.67(2H,s), 5.38-5.50(2H,m), 7.40-7.63(2H,m).

IR(CHCl₃): 2975, 1727, 1602, 1485, 1362, 1221, 1207, 1168, 1045/cm.

No.1a - 187

CDCl₃, 300MHz

1.10-2.25(14H,m), 2.36(2H,t, J=7.3Hz), 2.47(1H,m), 2.37(1H,m), 5.35-5.54(2H,m), 5.62(1H,d, J=7.3Hz), 7.39-7.70(2H,m).

IR(CHCl₃): 2974, 2996, 2978, 2924, 3012, 2952, 2880, 2850, 1725(sh), 1709, 1602, 1485, 1420, 1360, 1167/cm.

[α]_D²⁰ = +82° (CHCl₃, c=1.69).

No.1a - 188

CDCl₃, 200MHz

0.86-1.92(14H,m), 2.22(2H,m), 2.36(2H,s), 2.95(1H,m), 3.67(2H,s), 3.92(2H,s), 4.81(1H,d, J=8.2Hz), 5.04-5.20(2H,m), 7.02-7.08(2H,m), 7.31(1H,d, J=8.5Hz), 7.39(1H,d, J=7.6Hz), 7.79-7.89(2H,m).

IR(CHCl₃): 2985, 2986, 3029, 3019, 3016, 2954, 2977, 1718, 1617, 1598, 1567, 1507, 1311, 1269, 1152 /cm.

[α]_D²⁰ = -29.4° (CHCl₃, c=1.01, 25°C).

No.1a - 189

[α]_D²⁰ = -7.7° (CHCl₃, c=1.00, 24°C).

No.1a - 190

[α]_D²⁰ = -17.8° (CHCl₃, c=1.00, 24°C).

No.1a - 191

CDCl₃, 300MHz

0.95-2.20(14H,m), 2.30(1H,m), 2.36(2H,d, J=6.9Hz), 2.21(1H,m), 4.25(2H,s), 5.07(1H,d, J=7.6Hz), 5.36-5.48(2H,m), 7.25(1H,dd, J=1.5 Hz), 8.1Hz), 7.32-7.55(2H,m), 7.59(1H,d, J=8.1Hz), 7.94(1H,s), 8.14(1H,d, J=2.7Hz), 8.23(1H,d, J=2.7 Hz), 8.7Hz).

IR(CHCl₃): 2986, 3026, 3015, 2957, 2977, 2883, 1702, 1617, 1573, 1530, 1348, 1128 /cm.

[α]_D²⁰ = -6.1° (CHCl₃, c=1.01, 25°C).

No.1a - 192

CDCl₃, 300MHz

0.92-2.20(14H,m), 2.18(3H,m), 2.23(1H,m), 2.64(3H,s), 2.94(3H,s), 4.22(2H,s), 4.34(1H,d,J=7.8Hz), 5.27-5.42(2H,m), 7.16-7.42(6H,m), 7.53(1H,d,J=8.4Hz), 7.94(1H,s).

IR(CHCl₃): 2989, 2922, 2912, 2953, 2877, 1716, 1616, 1560, 1455, 1340, 1332, 1124 /cm.

[α]_D²⁰ = -18.2° (CHCl₃, c=1.01, 25°C).

No. 1a - 193

CDCl₃, 300MHz

0.92-2.20(14H,m), 2.25(1H,m), 2.35(2H,t,J=7.3Hz), 2.17(1H,m), 4.22(2H,s), 4.91(1H,d,J=7.5Hz), 5.27-5.42(2H,m), 7.18-7.43(6H,m), 7.60(1H,d,J=8.1Hz), 8.05(1H,s).

IR(CHCl₃): 2911, 2887, 3029, 3020, 3011, 2987, 2877, 2851, 1698, 1614, 1560, 1506, 1320, 1280, 1252, 1128 /cm.

[α]_D²⁰ = -0.9° (CHCl₃, c=1.00, 25°C).

No. 1b - 1

CDCl₃, 300MHz

0.98-1.56(15H,m), 1.85-1.90(5H,m), 2.23(1H,m), 2.05(1H,m), 2.86(3H,s), 4.77(1H,d,J=8.0Hz), 5.08-5.28(2H,m), 7.46(3H,m), 7.38-7.54(2H,d,J=7.5Hz), 7.72(2H,d,J=8.4Hz), 7.93(2H,d,J=8.4Hz).

IR(CHCl₃): 2984, 3028, 2952, 2876, 1719, 1595, 1391, 1322, 1155 /cm.

[α]_D²⁵ = +4.0→6.0 (CHCl₃, c=1.00, 25°C).

mp. 98-98°C

No. 1b - 2

CDCl₃, 300MHz

0.98-1.52(15H,m), 1.85-1.90(5H,m), 2.17(1H,m), 2.00(1H,m), 2.67(3H,s), 4.06(2H,s), 4.89(1H,d,J=6.0Hz), 5.05-5.28(2H,m), 7.14(2H,d,J=7.2Hz), 7.17-7.32(5H,m), 7.78(2H,d,J=8.4Hz).

IR(CHCl₃): 2984, 3028, 2952, 2874, 1719, 1595, 1458, 1407, 1320, 1180 /cm.

[α]_D²⁰ = +2.5° (CHCl₃, c=1.02, 24°C).

No. 1b - 3

CDCl₃, 300MHz

0.96-2.05(20H,m), 2.07(1H,m), 2.07(1H,m), 4.04(2H,s), 5.21-5.35(2H,m), 5.55(1H,d,J=6.9Hz), 7.14(2H,d,J=8.6Hz), 7.20-7.32(5H,m), 7.78(2H,d,J=8.1H).

IR(CHCl₃): 2950, 3022, 2950, 1699, 1596, 1495, 1453, 1405, 1318, 1153 /cm.

[α]_D²⁰ = +17.1° (CHCl₃, c=1.01, 25°C).

mp. 129-131°C.

No. 1b - 4

CDCl₃, 300MHz

0.90-2.10(15H,m), 1.19(3H,s), 1.20(3H,s), 2.11(1H,m), 5.24-5.32(2H,m), 5.70(1H,d,J=8.6Hz), 7.28-7.68(4H,m), 7.96-8.04(2H,m), 8.88(1H,d,J=1.4Hz).

IR(CHCl₃): 3384, 3246, 2958, 1701, 1622, 1595, 1468, 1445, 1322, 1218, 1202, 1190, 1155, 1122 /cm.

[α]_D²⁰ = +10.8° (CHCl₃, c=0.51, 23°C).

No. 1b - 5

1.02-2.10(15H,m), 1.18(3H,s), 2.02(1H,m), 4.09(2H,s), 5.23-5.28(2H,m), 5.78(1H,d,J=7.2Hz), 7.36-7.63(4H,m), 7.97(1H,d,J=7.5Hz), 8.18(1H,s).

IR(CHCl₃): 2989, 2959, 1702, 1685, 1585, 1468, 1454, 1441, 1415, 1318, 1222, 1189, 1170, 1154 /cm.

[α]_D²⁰ = +9.9° (CHCl₃, c=1.00, 25°C).

No. 1c - 1

CDCl₃, 300MHz

1.10-2.03(14H,m),2.27(2H,t,J=7.5Hz),2.50(1H,m),2.59(3H,s),2.51(1H,m),2.6
4(3H,s),5.16-5.30(2H,m),7.34-7.42(3H,m),7.50-7.59(2H,m),7.62-7.68(2H,m),
7.76-7.82(2H,m).

IR(CHCl₃):3020,2946,2868,2212,1727,1596,1495,1487,1329,1158,1135,1084
/cm.

[α]_D=-16.1° (CHCl₃,c=1.05,25.0°C).

m.p.100-102°C

No.1c-2

CDCl₃ 300MHz

1.10-2.05(14H,m),2.23(2H,t,J=7.5Hz),2.55(1H,m),2.91(3H,s),2.85(1H,m),2.6
2(3H,s),5.02-5.30(2H,m),7.50-7.60(3H,m),7.90-8.05(6H,m).

IR(CHCl₃):3016,2946,2868,1728,1487,1398,1340,1160,1086 /cm.

[α]_D=-22.5° (CHCl₃,c=1.00,25.0°C).

No.1c-3

CD₃OD 300MHz

1.15-2.05(14H,m),2.13(2H,t,J=7.2Hz),2.47(1H,m),2.91(3H,s),2.27(1H,m),4.9
0-5.30(2H,m),7.27-7.44(3H,m),7.53-7.61(2H,m),7.71-7.77(2H,m),7.81-7.87(2
H,m).

IR(KBr):3412,2999,2951,2871,2217,1560,1399,1243,1159,1137,1103,1084.

[α]_D=-5.6° (CH₃OH,c=1.03,25°C).

No.1d-1

CDCl₃ 300MHz

1.00-2.16(15H,m),2.36(2H,t,J=7.2Hz),2.17(1H,m),2.33(3H,s),5.23-5.43(3H,m
)7.51-7.59(3H,m),7.91-8.10(6H,m),9.02(1H,br).

IR(CHCl₃):3282,3268,3028,2954,2874,1715,1442,1400,1287,1162,1120,1089/
cm.

[α]_D=+40.0° (CHCl₃,c=0.53,22°C).

No.1d-2

CDCl₃ 300MHz

1.03-2.30(17H,m),2.03(1H,m),4.03(2H,s),5.26(2H,m),5.84(1H,br),5.25-5.29(1
H,d,J=6.6Hz),6.03(1H,br),7.14(2H,d,J=3.1Hz),7.26-7.31(5H,m),7.30(2H,d,J=
6.1Hz).

IR(CHCl₃):3275,3002,2946,1669,1595,1492,1454,1406,1318,1154/cm.

[α]_D=+4.3° (CHCl₃,c=1.00,23°C).

No.1d-3

CDCl₃ 300MHz

0.96-2.17(17H,m),2.33(2H,t,J=6.9Hz),3.01(1H,m),4.04(2H,s),5.10(1H,d,J=6.
6Hz),5.21-5.26(2H,m),7.14(2H,d,J=3.7Hz),7.16-7.32(5H,m),7.73(2H,d,J=3.4
Hz).

IR(CHCl₃):3280,3020,2946,1711,1596,1492,1457,1407,1318,1154/cm.

[α]_D=+9.8° (CHCl₃,c=1.08,25°C).

No.1d-4

CDCl₃ 300MHz

0.95-2.14(15H,m),2.34(2H,t,J=7.2Hz),3.09(1H,m),3.30(3H,s),4.04(2H,s),5.19
(1H,d,J=7.2Hz),5.22-5.39(2H,m),7.10-7.35(7H,m),7.51(2H,d,J=3.1Hz),9.10(1
H,br).

IR(CHCl₃):3282,3260,3028,2952,2874,2670,1713,1595,1492,1450,1406,1336,
1160,1120,1092/cm.

[α]_D=+22.3° (CHCl₃,c=1.07,22°C).

No.1d-5

CDCl₃ 300MHz

1.00-2.10(14H,m), 2.30-2.39(3H,m), 2.15(1H,m), 2.35(3H,s), 5.15-5.40(2H,m), 7.41(1H,d,t,J=0.9 Hz, 7.8Hz), 7.50-7.69(3H,m), 7.83-8.15(2H,m), 8.60(1H,d,J=1.5Hz), 9.06(1H,s).
IR(CHCl₃): 3382, 3268, 3028, 2934, 2874, 1714, 1448, 1402, 1338, 1183, 1155, 1121, 1072/cm.
[α]_D²⁰ = +15.2° (CHCl₃, c=1.00, 23°C).

No. 1e-1

CDCl₃, 300MHz
1.19-2.45(19H,m), 2.55(1H,m), 5.63(1H,d,J=8.0Hz), 7.42-7.65(4H,m), 7.94-8.03(2H,m), 8.49-8.60(1H,m).
IR(CHCl₃): 3293, 3024, 1710, 1595, 1594, 1467, 1445, 1410, 1324, 1222, 1213, 1206, 1190, 1160/cm.
[α]_D²⁰ = -41.1° (CHCl₃, c=1.01, 23°C).

No. 1e-2

CDCl₃, 300MHz
1.10-2.25(19H,m), 2.94(1H,m), 4.12(3H,s), 5.53(1H,d,J=7.2Hz), 7.39(1H,m), 7.60-7.62(3H,m), 7.96(1H,d,J=7.5Hz), 8.18(1H,s).
IR(CHCl₃): 3387, 3025, 2955, 1711, 1634, 1600, 1584, 1468, 1454, 1440, 1415, 1342, 1317, 1222, 1189, 1157/cm.
[α]_D²⁰ = +1.2° (CHCl₃, c=1.00, 25°C).

No. 1f-1

CDCl₃, 300MHz
1.08-2.47(19H,m), 2.56(1H,m), 3.52(2H,t,J=6.8Hz), 5.59(1H,d,J=2.4Hz), 7.40-7.66(4H,m), 7.95-8.04(2H,m), 8.50(1H,d,J=1.8Hz).
IR(CHCl₃): 3324, 3383, 3295, 2950, 2877, 1705, 1595, 1584, 1465, 1445, 1405, 1347, 1337, 1324, 1224, 1190, 1160/cm.
[α]_D²⁰ = -54.1° (CHCl₃, c=1.01, 23°C).

No. 1f-2

CDCl₃, 300MHz
1.05-2.34(19H,m), 2.94(1H,m), 3.53(2H,t,J=6.8Hz), 4.13(3H,s), 5.47(1H,d,J=6.6Hz), 7.36-7.63(4H,m), 7.96(1H,d,J=6.8Hz), 8.14(1H,s).
IR(CHCl₃): 3325, 3365, 3025, 3018, 2949, 2877, 1710, 1634, 1600, 1584, 1465, 1454, 1440, 1415, 1342, 1317, 1232, 1220, 1189, 1157/cm.
[α]_D²⁰ = -5.6° (CHCl₃, c=1.00, 25°C).

No. 1g-1

CDCl₃, 300MHz
1.17-2.34(15H,m), 3.22(1H,m), 5.10-5.16(2H,m), 5.45(1H,d,J=7.0Hz), 7.35-7.66(4H,m), 7.95-8.01(2H,m), 8.51(1H,d,J=2.0Hz).
IR(CHCl₃): 3383, 3275, 2939, 1707, 1595, 1584, 1468, 1445, 1425, 1319, 1269, 1245, 1190, 1149, 1128/cm.
[α]_D²⁰ = +64.3° (CHCl₃, c=1.01, 23°C).

No. 1g-2

CDCl₃, 300MHz
1.10-2.15(15H,m), 2.36(2H,t,J=7.2Hz), 3.21(1H,m), 4.09(3H,s), 5.10-5.22(2H,m), 5.43(1H,d,J=7.8Hz), 7.36-7.62(4H,m), 7.96(1H,d,J=7.8Hz), 8.12(1H,s).
IR(CHCl₃): 3366, 2959, 1705, 1635, 1600, 1585, 1467, 1454, 1440, 1415, 1345, 1318, 1233, 1189, 1152/cm.
[α]_D²⁰ = +108.1° (CHCl₃, c=1.01, 23°C).

No. 1h-1

CDCl₃, 300MHz
0.90-1.60(17H,m), 1.83(1H,m), 2.11(1H,m), 2.22(2H,t,J=7.2Hz), 3.07(1H,m), 5.

11(1H,d,J=7.2Hz), 7.55-7.47(1H,m), 7.50-7.60(1H,m), 7.60-7.72(2H,m), 7.82-8.
12(2H,m), 8.54(1H,d,J=0.9Hz).
IR(CHCl₃): 3282, 3274, 2928, 1707, 1484, 1442, 1318, 1268, 1188, 1162, 1121, 1105,
1071, 1019/cm.
[α]_D²⁰ = -2.6° (CHCl₃, c=1.01, 23°C).

No. 1i-1
[α]_D²⁰ = +50.9° (CHCl₃, c=1.01, 24°C).

No. 1i-2
CDCl₃, 300MHz
0.98-1.70(11H,m), 1.80-2.00(5H,m), 2.19(1H,m), 2.08(1H,m), 2.64(2H,t,J=8.6H
z), 4.05(2H,s), 4.89(1H,d,J=8.6Hz), 5.15(1H,m), 5.25(1H,m), 7.16(2H,d,J=7.2Hz
) , 7.27-7.32(5H,m), 7.77(2H,d,J=8.4Hz).
IR(CHCl₃): 3278, 3004, 2946, 2816, 1696, 1492, 1453, 1407, 1318, 1154/cm.
[α]_D²⁰ = +3.5° (CHCl₃, c=1.00, 22°C).
mp. 80.5-82.0°C

No. 1j-1
[α]_D²⁰ = -7.5 ± 0.5° (CHCl₃, c=1.05, 22°C).

No. 1j-2
[α]_D²⁰ = -9.7 ± 0.5° (CHCl₃, c=1.06, 22°C).

No. 1j-3
[α]_D²⁰ = +15.0 ± 0.5° (CH₃OH, c=1.06, 24.5°C).
mp. 101-103°C

No. 1j-4
[α]_D²⁰ = -28.0 ± 0.6° (CHCl₃, c=1.06, 24°C).
mp. 189-191°C

1j-5
[α]_D²⁰ = -12.5 ± 0.5° (CHCl₃, c=1.04, 23°C).
mp. 99-101°C

No. 1j-6
CDCl₃, 300MHz
0.90-2.03(14H,m), 2.20(1H,m), 2.30(2H,t,J=7.2Hz), 2.00(1H,m), 2.66(2H,s), 4.76
(1H,d,J=8.8Hz), 5.15-5.35(2H,m), 7.01-7.08(4H,m), 7.19-7.26(1H,m), 7.37-7.46
(2H,m), 7.60-7.64(2H,m).
IR(CHCl₃): 3282, 3280, 3080, 3016, 2952, 2900, 1727, 1582, 1486, 1482, 1322, 1150/
cm.
[α]_D²⁰ = -31.0° (CHCl₃, c=1.05, 26°C).

No. 1j-7
CDCl₃, 300MHz
0.91-2.09(14H,m), 2.15(1H,m), 2.35(2H,t,J=7.5Hz), 2.01(1H,m), 2.17(1H,d,J=8.
6Hz), 5.31-5.54(2H,m), 7.01-7.08(4H,m), 7.15-7.27(1H,m), 7.37-7.48(2H,m), 7.5
0-7.65(2H,m).
IR(CHCl₃): 3474, 3386, 3270, 3024, 2958, 2900, 2875, 1711, 1584, 1488, 1420, 1322,
1298, 1150/cm.
[α]_D²⁰ = -13.4° (CHCl₃, c=1.01, 26°C).

No. 1j-8
CDCl₃, 300MHz
0.95-2.14(13H,m), 2.30(2H,t,J=7.5Hz), 2.26(1H,m), 2.84(1H,m), 2.91(1H,d,J=4.8Hz
) , 3.66(2H,s), 5.33-5.53(2H,m), 6.82-6.87(1H,m), 6.93-7.00(2H,m), 7.09-7.15(4H,

m), 7.28-7.26(2H,m), 7.54-7.59(1H,m).
IR(CHCl₃): 3350, 3010, 2950, 2880, 1722, 1608, 1582, 1489, 1481, 1438, 1380, 1160
/cm.
[α]_D²⁰ = +75.1° (CHCl₃, c=1.18, 25°C).

No. 1j-9

CDCl₃, 300MHz
0.95-2.08(14H,m), 2.20(1H,m), 2.39(2H,t, J=7.5Hz), 3.06(1H,m), 3.68(3H,s), 4.9
8(1H,d, J=7.4Hz), 5.14-5.34(2H,m), 7.46-7.54(2H,m), 7.60-7.68(1H,m), 7.75-7.8
0(2H,m), 7.88-7.92(2H,m), 7.99-8.03(2H,m).
IR(CHCl₃): 3384, 3280, 3020, 2960, 2852, 1727, 1662, 1600, 1516, 1278, 1162/cm.
[α]_D²⁰ = -41.0° (CHCl₃, c=1.17, 25°C).

No. 1j-10

CDCl₃+CD₃OD 300MHz
0.94-2.08(14H,m), 2.21(1H,m), 2.34(2H,t, J=6.2Hz), 3.04(1H,m), 5.21-5.35(2H,
m), 5.40(1H,m), 7.48-7.58(2H,m), 7.64-7.68(1H,m), 7.79-8.06(3H,m).
IR(CHCl₃): 3475, 3370, 3250, 3018, 2956, 2976, 2860, 1709, 1662, 1595, 1445, 1420,
1395, 1317, 1274, 1162/cm.
[α]_D²⁰ = -17.1° (CHCl₃, c=1.13, 25°C).

No. 1j-11

CDCl₃, 300MHz
1.06-1.98(14H,m), 2.24-2.29(3H,m), 3.18(1H,m), 3.66(3H,s), 5.10-5.34(2H,m), 5.
40(1H,d, J=6.3Hz), 7.39-7.49(3H,m), 7.59-7.64(3H,m), 7.80-7.83(2H,m), 8.06-8.
11(1H,m).
IR(CHCl₃): 3302, 3012, 2948, 2905, 1727, 1661, 1592, 1485, 1382, 1312, 1287, 1271,
1165/cm.
[α]_D²⁰ = +15.5° (CHCl₃, c=1.03, 25°C).

No. 1j-12

CDCl₃, 300MHz
1.08-1.98(14H,m), 2.23(1H,m), 2.33(2H,t, J=7.5Hz), 3.16(1H,m), 5.18-5.26(2H,
m), 5.39-5.46(1H,m), 7.39-7.49(3H,m), 7.60-7.64(3H,m), 7.80-7.83(2H,m), 8.09-
8.12(1H,m).
IR(CHCl₃): 3325, 3022, 2956, 2872, 2850, 1708, 1662, 1608, 1598, 1425, 1340, 1316,
1288, 1271, 1165/cm.
[α]_D²⁰ = +9.7° (CHCl₃, c=0.52, 25°C).

No. 1j-13

CDCl₃, 300MHz
0.95-2.00(14H,m), 2.20(1H,m), 2.27(2H,t, J=6.8Hz), 3.03(1H,m), 3.67(3H,s), 4.9
9(1H,d, J=6.6Hz), 5.12-5.31(2H,m), 7.47-7.55(2H,m), 7.60-7.69(2H,m), 7.76-7.8
1(2H,m), 7.96-8.05(1H,m), 8.08-8.14(1H,m), 8.27-8.28(1H,m).
IR(CHCl₃): 3674, 3538, 3376, 3276, 3012, 2948, 2860, 1726, 1662, 1595, 1440, 1385,
1317, 1297, 1274, 1166, 1160/cm.
[α]_D²⁰ = +10.3° (CHCl₃, c=1.00, 25°C).

No. 1j-14

CDCl₃, 300MHz
0.93-2.08(14H,m), 2.21(1H,m), 2.32(2H,t, J=6.3Hz), 3.00(1H,m), 5.20-5.26(2H,
m), 5.38(1H,d, J=6.3Hz), 7.50-7.55(2H,m), 7.83-7.71(3H,m), 7.77-7.81(2H,m), 7.
99-8.04(1H,m), 8.10-8.18(1H,m), 8.32-8.38(1H,m).
IR(CHCl₃): 3674, 3480, 3374, 3258, 3012, 2950, 2876, 2850, 1709, 1662, 1592, 1418,
1385, 1317, 1274, 1142/cm.
[α]_D²⁰ = +61.0° (CHCl₃, c=1.19, 25°C).

No. 1j-15

CDCl₃, 800MHz

0.90-2.00(14H,m), 2.19(1H,m), 2.80(2H,t,J=7.5Hz), 3.01(1H,m), 3.67(3H,s), 4.8
2(1H,d,J=8.6Hz), 5.14-5.34(2H,m), 7.86-7.89(2H,m), 7.88-7.97(2H,m), 7.62-7.6
6(2H,m), 7.88-7.89(2H,m).

IR(CHCl₃): 3376, 3276, 3010, 2948, 2866, 2212, 1727, 1597, 1500, 1437, 1325, 1161/
cm.

[α]_D²⁰ = -7.2° (CHCl₃, c=1.00, 26°C).

No.1j-16

CDCl₃, 800MHz

0.98-2.09(14H,m), 2.15(1H,m), 2.36(2H,t,J=7.5Hz), 3.05(1H,m), 5.20-5.40(3H,
m), 7.86-7.89(3H,m), 7.55-7.66(4H,m), 7.84-7.88(2H,m).

IR(CHCl₃): 3470, 3376, 3260, 3012, 2960, 2868, 2675, 2212, 1708, 1596, 1503, 1416,
1396, 1322, 1160.

[α]_D²⁰ = -22.4° (CHCl₃, c=1.00, 26°C).

No.1j-17

CDCl₃, 800MHz

1.00-1.60(9H,m), 1.79-1.89(5H,m), 2.17(1H,brs), 2.23(2H,t,J=7.2Hz), 3.03(1H,
m), 5.10-5.23(2H,m), 5.49(1H,d,J=8.6Hz), 7.40(1H,t,J=7.4Hz), 7.53(1H,t,J=7.2
Hz), 7.60-7.68(2H,m), 7.95-8.03(2H,m), 8.55(1H,d,J=1.5Hz).

IR(CHCl₃): 3516, 3364, 3270, 2666, 1708, 1632, 1595, 1534, 1467, 1445, 1425, 1374,
1245, 1221, 1259, 1245, 1215/cm.

[α]_D²⁰ = -7.8° (CHCl₃, c=1.01, 22°C).

No.1j-18

CDCl₃, 800MHz

0.90-2.03(14H,m), 2.19(1H,m), 2.80(2H,t,J=7.5Hz), 3.00(1H,m), 3.67(3H,s), 4.8
0(1H,d,J=8.4Hz), 5.14-5.35(2H,m), 6.99-7.04(2H,m), 7.16-7.22(3H,m), 7.34-7.4

9(4H,m), 7.57-7.61(1H,m).

IR(CHCl₃): 3376, 3276, 3012, 2948, 2875, 1727, 1582, 1432, 1471, 1432, 1330, 1311,
1160/cm.

[α]_D²⁰ = +54.0° (CHCl₃, c=0.99, 25°C).

No.1j-19

CDCl₃, 800MHz

0.91-2.09(14H,m), 2.15(1H,m), 2.94(2H,t,J=7.5Hz), 3.01(1H,m), 5.16(1H,d,J=8.
6Hz), 5.24-5.40(2H,m), 7.01-7.08(2H,m), 7.15-7.25(3H,m), 7.35-7.63(4H,m), 7.5
9-7.65(1H,m).

IR(CHCl₃): 3470, 3376, 3260, 3012, 2950, 2875, 2640, 1708, 1583, 1468, 1471, 1430,
1325, 1305, 1149/cm.

[α]_D²⁰ = -21.0° (CHCl₃, c=1.30, 26°C).

No.1j-20

CDCl₃, 800MHz

1.17(1H,m), 1.26-1.34(2H,m), 1.54-2.24(11H,m), 2.31(2H,t,J=7.4Hz), 2.48(1H,
brs), 3.37(1H,m), 3.67(3H,s), 5.35-5.60(2H,m), 7.89-7.63(9H,m).

IR(CHCl₃): 3377, 1727, 1601, 1435, 1362, 1169/cm.

No.1j-21

CDCl₃, 800MHz

1.10-2.25(14H,m), 2.66(2H,t,J=7.2Hz), 2.47(1H,m), 2.89(1H,m), 5.85-5.53(2H,
m), 5.63(1H,d,J=7.2Hz), 7.40-7.71(9H,m).

IR(CHCl₃): 3674, 3495, 3374, 3234, 3010, 2952, 2870, 2640, 1730(sh), 1710, 1605, 1
485, 1426, 1360, 1167/cm.

[α]_D²⁰ = -48.0° (CHCl₃, c=1.01, 25°C).

No.1j-22

CDCl₃, 800MHz
0.98-1.96(14H,m), 2.25-2.31(3H,m), 2.95(1H,m), 5.19-5.30(2H,m), 5.89(1H,d,J=8.9Hz), 6.59(1H,d,J=7.5Hz), 6.80(1H,t,J=7.5Hz), 6.99-7.05(1H,m), 7.44-7.53(6H,m), 7.60-7.73(3H,m), 7.94-7.75(5H,m), 8.23-8.26(2H,m), 10.65(1H,s).
IR(CHCl₃): 3475, 3372, 3260, 3008, 2953, 2868, 2722, 1735, 1710(ab), 1662, 1590, 1571, 1525, 1448, 1437, 1345, 1314, 1181, 1112/cm.
[α]_D²⁰ = +12.9° (CH₂Cl₂, c=0.12, 25°C).

No.1j- 2 3
CDCl₃, 800MHz
0.94-1.94(14H,m), 2.22-2.30(3H,m), 2.98(1H,m), 3.63(2H,s), 5.09(1H,d,J=6.2Hz), 5.15-5.23(2H,m), 7.14-7.22(1H,m), 7.34-7.42(2H,m), 7.55-7.73(2H,m), 7.99-8.03(4H,m), 8.51(1H,s).
IR(CHCl₃): 3372, 3275, 1724, 1678, 1699, 1428, 1320, 1161/cm.
[α]_D²⁰ = +17.0° (CHCl₃, c=1.38, 25°C).

No.1j- 2 4
CDCl₃+CD₃OD 800MHz
0.96-2.05(14H,m), 2.25-2.34(3H,m), 2.92(1H,m), 5.16-5.34(2H,m), 7.14-7.22(1H,m), 7.29-7.42(2H,m), 7.70(2H,d,J=7.6Hz), 7.92-8.05(4H,m).
IR(CHCl₃): 3616, 3426, 3375, 3010, 2950, 2828, 2845, 1708, 1672, 1699, 1439, 1323, 1161/cm.
[α]_D²⁰ = +21.0° (CH₃OH, c=1.00, 22°C).

No.1j- 2 5
CDCl₃, 800MHz
1.03(1H,m), 1.18-2.01(18H,m), 2.20(1H,brs), 2.27(2H,t,J=7.4Hz), 3.06(1H,m), 3.66(2H,s), 5.11(1H,d,J=6.6Hz), 5.14-5.24(2H,m), 7.54-7.62(3H,m), 8.04-8.32(6H,m).
IR(CHCl₃): 3384, 3278, 1726, 1605, 1464, 1448, 1331, 1161/cm.

No.1j- 2 6
CDCl₃+CD₃OD 800MHz
1.03-2.10(14H,m), 2.22(1H,m), 2.31(2H,t,J=7.5Hz), 2.98(1H,m), 5.28-5.35(2H,m), 7.55-7.66(3H,m), 8.05-8.08(2H,m), 8.14-8.16(2H,m), 8.28-8.31(2H,m).
IR(ν_{max}): 3260, 2720, 2660, 1711, 1545, 1460, 1317, 1163/cm.
[α]_D²⁰ = +15.8° (CH₃OH, c=1.01, 22°C).

No.1j- 2 7
[α]_D²⁰ = +16.7° (CHCl₃, c=1.00, 23°C).

No.1j- 2 8
CDCl₃, 800MHz
1.01(1H,m), 1.14-1.29(2H,m), 1.46-2.19(11H,m), 2.33(2H,t,J=7.2Hz), 2.41(1H,brs), 3.18-3.21(6H,m), 3.66(3H,s), 3.75-3.76(4H,m), 4.37(1H,d,J=7.2Hz), 5.35-5.45(2H,m).
IR(CHCl₃): 3592, 1727, 1435, 1335, 1148/cm.
[α]_D²⁰ = +10.7° (CHCl₃, c=1.39, 26°C).

No.1j- 2 9
CDCl₃, 800MHz
1.00(1H,m), 1.20-1.29(2H,m), 1.48-2.25(12H,m), 2.37(2H,t,J=7.2Hz), 3.17-3.2(2H,m), 3.74-3.79(4H,m), 4.79(1H,d,J=7.8Hz), 5.34-5.54(2H,m).
IR(CHCl₃): 3470, 3390, 3270, 3675, 1709, 1455, 1420, 1315, 1147/cm.
[α]_D²⁰ = +16.8° (CHCl₃, c=1.42, 26°C).

No.1k- 1
[α]_D²⁰ = -35.4° (CHCl₃, c=1.06, 23°C).

No.1k-2

CDCl₃, 300MHz

1.07-2.28(14H,m), 2.82(2H,t,J=7.4Hz), 2.62(1H,m), 3.68(3H,s), 3.98(1H,m), 5.8
0-5.52(2H,m), 6.88(1H,d,J=7.0Hz), 7.48-7.60(2H,m), 7.88-8.02(6H,m).
IR(CHCl₃): 3488, 3002, 2946, 2868, 1727, 1652, 1514, 1485, 1388, 1310, 1245, 1154
/cm.

[α]_D²⁰ = -80.4° (CHCl₃, c=1.01, 24.0°C).

No.1k-3

CDCl₃, 300MHz

1.10-2.26(14H,m), 2.27(2H,t,J=7.2Hz), 2.60(1H,m), 3.93(1H,m), 5.90-5.50(2H,
m), 6.88(1H,d,J=7.5Hz), 7.46-7.58(3H,m), 7.88-7.99(6H,m).
IR(CHCl₃): 3448, 3004, 2952, 2874, 1709, 1652, 1515, 1485, 1305, 1158 /cm.

[α]_D²⁰ = -96.4° (CHCl₃, c=1.05, 23.0°C).

No.1k-4

CDCl₃, 300MHz

1.05-2.17(14H,m), 2.58(2H,t,J=7.2Hz), 2.52(1H,m), 3.81(1H,m), 5.83-5.50(2H,
m), 6.08(1H,d,J=7.6Hz), 7.39-7.53(3H,m), 7.57-7.63(6H,m).
IR(CHCl₃): 3420, 3250, 3008, 2948, 2870, 2660, 2208, 1735(sh), 1705, 1640, 1500/
cm.

[α]_D²⁰ = -21.9 ± 0.6° (CHCl₃, c=1.02, 22°C).

No.1k-5

CDCl₃, 300MHz

1.05-2.14(14H,m), 2.38(2H,t,J=7.2Hz), 2.51(1H,m), 3.81(1H,m), 5.34-5.46(2H,
m), 6.07(1H,d,J=7.6Hz), 7.38-7.56(6H,m).
IR(CHCl₃): 3422, 3250, 3010, 2950, 2876, 2664, 2558, 2210, 1735(sh), 1705, 1645, 1

502, 1441, 1410, 1307, 1278/cm.

[α]_D²⁰ = -63.6 ± 1.9° (CHCl₃, c=0.56, 22°C).

No.1k-6

CDCl₃, 300MHz

1.04-2.24(14H,m), 2.88(2H,t,J=7.5Hz), 2.58(1H,m), 3.88(1H,m), 5.30-5.48(2H,
m), 6.21(1H,d,J=7.2Hz), 7.41-7.49(3H,m), 7.72-7.77(2H,m).
IR(CHCl₃): 3447, 3011, 2955, 1706, 1658, 1608, 1578, 1515, 1488, 1457, 1312, 1211,
1164/cm.

[α]_D²⁰ = -80.3° (CHCl₃, c=1.00, 23°C).

No.1k-7

CDCl₃, 300MHz

1.04-2.22(14H,m), 2.26(2H,t,J=7.2Hz), 2.57(1H,m), 3.87(1H,m), 5.30-5.44(2H,
m), 6.17(1H,d,J=8.7Hz), 6.99-7.40(7H,m), 7.73(2H,d,J=7.5Hz).
IR(CHCl₃): 3449, 3013, 2955, 1759, 1706, 1651, 1609, 1588, 1522, 1487, 1248, 1227,
1169/cm.

[α]_D²⁰ = -60.2° (CHCl₃, c=0.92, 23°C).

No.1k-8

CDCl₃, 300MHz

1.04-2.35(14H,m), 2.24(2H,t,J=7.5Hz), 2.56(1H,m), 3.87(1H,m), 5.30-5.44(2H,
m), 6.19(1H,d,J=7.5Hz), 6.83-6.94(6H,m), 7.59(2H,d,J=8.7Hz).
IR(CHCl₃): 3599, 3455, 3012, 2955, 1711, 1644, 1604, 1577, 1594, 1507, 1492, 1290,
1286, 1197, 1170/cm.

[α]_D²⁰ = -47.7° (CHCl₃, c=1.01, 23°C).

No.1k-9

CDCl₃, 300MHz

1.04-2.20(14H,m),2.31(3H,s),2.36(2H,t,J=7.2Hz),2.56(1H,m),2.56(1H,m),5.3
0-5.43(2H,m),6.18(1H,d,J=7.2Hz),7.00-7.11(3H,m),7.74(2H,d,J=8.7Hz).
IR(CHCl₃):8450,8010,2955,1750,1709,1681,1605,1596,1523,1489,1370,1247,
1227,1182/cm.
[α]_D=-54.7° (CHCl₃,c=1.01,22°C).

No.1k-10

CDCl₃, 300MHz

1.04-2.22(14H,m),2.35(2H,t,J=7.2Hz),2.56(1H,m),2.56(3H,s),2.56(1H,m),5.3
0-5.43(2H,m),6.17(1H,d,J=6.9Hz),6.89-7.01(3H,m),7.70(2H,d,J=8.7Hz).
IR(CHCl₃):3023,2955,1742,1708,1649,1612,1602,1577,1522,1507,1490,1227,
1210,1170/cm.
[α]_D=-58.1° (CHCl₃,c=1.01,22°C).

No.1m-1

CDCl₃, 300MHz

1.06-2.25(14H,m),2.32(2H,t,J=7.4Hz),2.61(1H,m),2.63(3H,s),2.91(1H,m),5.3
3-5.47(2H,m),6.24(1H,d,J=6.9Hz),7.35-7.38(3H,m),7.53-7.60(4H,m),7.75-7.7
8(2H,m).
IR(CHCl₃):3438,3008,2946,2875,2212,1732,1650,1605,1519,1498/cm.
[α]_D= +76° (CHCl₃,c=1.39,24°C)

No.1m-2

CDCl₃, 300MHz

1.05-2.20(14H,m),2.36(2H,t,J=6.2Hz),2.59(1H,m),2.59(1H,m),5.29-5.48(2H,
m),6.26(1H,d,J=7.0Hz),7.28-7.38(3H,m),7.52-7.60(4H,m),7.73-7.77(2H,m).
IR(CHCl₃):3444,3012,2952,2874,2664,2214,1718(sh),1708,1649,1605,1520,1
498/cm.
[α]_D= +81.4° (CHCl₃,c=1.01,22°C)

No.1m-3

CDCl₃, 300MHz

1.06-2.23(14H,m),2.32(2H,t,J=7.0Hz),2.62(1H,m),2.63(2H,s),2.93(1H,m),5.3
0-5.50(2H,m),6.26(1H,d,J=7.0Hz),7.38-7.51(3H,m),7.53-7.67(4H,m),7.82-7.8
8(2H,m).
IR(CHCl₃):3432,3008,2948,2875,1783(w),1727,1650,1608,1560(w),1523,150
1,1482/cm.
[α]_D= +59° (CHCl₃,c=1.49,25°C)

No.1m-4

CDCl₃, 300MHz

1.08-2.25(14H,m),2.36(2H,t,J=7.4Hz),2.59(1H,m),2.91(1H,m),5.28-5.48(3H,
m),6.29(1H,d,J=7.4Hz),7.38-7.50(3H,m),7.61-7.67(4H,m),7.81-7.86(2H,m).
IR(CHCl₃):3436,3010,2948,2868,1727,1715(sh),1649,1616(w),1524,1502,14
82,1372/cm.
[α]_D= +72° (CHCl₃,c=0.96,25°C)

No.1m-5

CDCl₃, 300MHz

1.09-2.20(14H,m),2.32(2H,t,J=7.2Hz),2.63(1H,m),2.63(2H,s),2.92(1H,m),5.3
1-5.51(2H,m),6.35(1H,d,J=7.0Hz),7.51-7.60(3H,m),7.92-7.97(3H,m).
IR(CHCl₃):3436,3008,2946,2875,1727,1652,1608(w),1515,1484/cm.
[α]_D= +82° (CHCl₃,c=0.99,25°C)

No.1m-6

CDCl₃, 300MHz

1.09-2.23(14H,m),2.37(2H,t,J=7.2Hz),2.60(1H,m),2.92(1H,m),5.20-5.49(2H,
m),6.32(1H,d,J=7.4Hz),7.51-7.55(3H,m),7.55-7.98(3H,m).

IR(CHCl₃): 8436, 8010, 2950, 2875, 2870, 1727, 1718(sh), 1650, 1605(w), 1515, 1484/cm.

[α]_D²⁰ = +84° (CHCl₃, c=1.84, 25°C)

No. 1m-7

CDCl₃, 300MHz

1.03-2.16(14H, m), 2.32(2H, t, J=7.4Hz), 2.59(1H, m), 3.64(3H, s), 3.89(1H, m), 5.29-5.49(2H, m), 6.16(1H, d, J=7.8Hz), 6.98-7.08(4H, m), 7.14-7.20(1H, m), 7.34-7.41(2H, m), 7.72-7.78(2H, m).

IR(CHCl₃): 8435, 8008, 2948, 2868, 1727, 1648, 1610, 1586, 1519, 1485/cm.

[α]_D²⁰ = +84° (CHCl₃, c=1.29, 25°C).

No. 1m-8

CDCl₃, 300MHz

1.06-2.21(14H, m), 2.36(2H, t, J=7.5Hz), 2.58(1H, m), 3.88(1H, m), 5.31-5.46(2H, m), 6.17(1H, d, J=8.9Hz), 6.99-7.08(4H, m), 7.15-7.21(1H, m), 7.36-7.41(2H, m), 7.72-7.75(2H, m).

IR(CHCl₃): 3435, 3010, 2948, 2858, 2675, 1730(sh), 1709, 1647, 1608, 1586, 1520, 1485/cm.

[α]_D²⁰ = +86° (CHCl₃, c=0.97, 25°C)

No. 1m-9

CDCl₃, 300MHz

1.05-2.18(14H, m), 2.29-2.84(5H, m), 2.59(1H, m), 3.64(3H, s), 3.89(1H, m), 5.32-5.46(2H, m), 6.16(1H, d, J=7.8Hz), 7.00-7.11(6H, m), 7.74-7.77(2H, m).

IR(CHCl₃): 8440, 8010, 2946, 2868, 1729, 1649, 1595, 1519, 1485/cm.

[α]_D²⁰ = +47° (CHCl₃, c=0.82, 25°C).

No. 1m-10

CDCl₃, 300MHz

1.04-2.20(14H, m), 2.31-2.89(5H, m), 2.57(1H, m), 3.87(1H, m), 5.38-5.47(2H, m), 6.17(1H, d, J=7.0Hz), 6.99-7.12(6H, m), 7.72-7.78(2H, m).

IR(CHCl₃): 3674, 3572, 3435, 3010, 2948, 2868, 2626, 1748, 1710, 1648, 1615, 1595, 1520, 1489/cm.

[α]_D²⁰ = +51° (CHCl₃, c=0.91, 25°C)

No. 1m-11

CDCl₃, 300MHz

1.04-2.16(14H, m), 2.31(2H, t, J=7.2Hz), 2.59(1H, m), 3.63(3H, s), 3.89(1H, m), 5.29-5.49(2H, m), 6.24(1H, d, J=7.4Hz), 6.54(1H, s), 6.83-6.98(6H, m), 7.89-7.78(2H, m).

IR(CHCl₃): 3674, 3585, 3438, 3296, 3010, 2948, 2868, 1725, 1646, 1608, 1520, 1504, 1489/cm.

[α]_D²⁰ = +51° (CHCl₃, c=0.91, 25°C)

No. 1m-12

CDCl₃, 300MHz

1.04-2.21(14H, m), 2.33(2H, t, J=8.0Hz), 2.66(1H, m), 3.87(1H, m), 5.28-5.48(2H, m), 5.38(1H, d, J=8.0Hz), 6.75(1H, m), 6.87-6.94(6H, m), 7.66-7.71(2H, m), 9.63(1H, brs).

IR(CHCl₃): 3674, 3582, 3438, 3275, 3010, 2950, 2868, 2675, 1727, 1710(sh), 1643, 1608, 1522, 1504, 1490/cm.

[α]_D²⁰ = +30° (CHCl₃, c=0.97, 25°C)

No. 1m-13

CDCl₃, 300MHz

1.01-2.18(14H, m), 2.31(2H, t, J=7.4Hz), 2.58(1H, m), 3.63(3H, s), 3.82(2H, s), 3.89(1H, m), 5.39-5.48(2H, m), 6.14(1H, d, J=7.0Hz), 6.88-7.08(6H, m), 7.70-7.74(2H, m).

m).

IR(CHCl₃): 3442, 3402, 3004, 2946, 2868, 1727, 1648, 1600, 1518, 1499/cm.

[α]_D²⁰ = +42° (CHCl₃, c = 1.82, 26°C)

No. 1m-14

CDCl₃, 300MHz

1.05-2.21(14H, m), 2.85(2H, t, J = 7.2Hz), 2.85(1H, m), 3.82(2H, s), 3.88(1H, m), 5.2-5.48(2H, m), 6.16(1H, d, J = 7.2Hz), 6.88-7.03(2H, m), 7.68-7.78(2H, m).

IR(CHCl₃): 3438, 3012, 2948, 2870, 2850, 1780(sh), 1709, 1647, 1615(sh), 1601, 1519, 1492/cm.

[α]_D²⁰ = +64° (CHCl₃, c = 0.70, 25°C)

No. 1m-15

CDCl₃, 300MHz

1.05-2.20(14H, m), 2.29-2.36(5H, m), 2.62(1H, m), 3.68(3H, s), 3.92(1H, m), 5.20-5.50(2H, m), 6.25(1H, d, J = 7.2Hz), 7.16-7.21(2H, m), 7.59-7.64(4H, m), 7.88-7.87(2H, m).

IR(CHCl₃): 3446, 3010, 2946, 2868, 1745(sh), 1728, 1650, 1615, 1525, 1507, 1488/cm.

[α]_D²⁰ = +65.0° (CHCl₃, c = 1.02, 23°C)

No. 1m-16

CDCl₃, 300MHz

1.08-2.21(14H, m), 2.34-2.40(5H, m), 2.59(1H, m), 3.90(1H, m), 5.29-5.48(2H, m), 6.29(1H, d, J = 7.0Hz), 7.18(2H, d, J = 8.6Hz), 7.58-7.64(4H, m), 7.88(2H, d, J = 8.2Hz).

IR(CHCl₃): 3488, 3012, 2948, 2870, 2822, 1749, 1710, 1649, 1610, 1526, 1508, 1487/cm.

[α]_D²⁰ = +68° (CHCl₃, c = 1.31, 24°C)

No. 1m-17

CDCl₃, 300MHz

1.06-2.19(14H, m), 2.32(2H, t, J = 7.2Hz), 2.62(1H, m), 3.68(2H, s), 3.98(1H, m), 5.3-5.50(2H, m), 6.82(1H, d, J = 7.6Hz), 6.41(1H, s), 6.94(2H, d, J = 9.0Hz), 7.47(2H, d, J = 9.0Hz), 7.58(2H, d, J = 8.6Hz), 7.81(2H, d, J = 8.6Hz).

IR(CHCl₃): 3580, 3484, 3284, 3010, 2948, 2868, 1728, 1648, 1606, 1528, 1490/cm.

[α]_D²⁰ = +62.4° (CHCl₃, c = 1.01, 23°C)

No. 1m-18

CDCl₃+CD₃OD 300MHz

1.11-2.18(14H, m), 2.32(2H, t, J = 7.4Hz), 2.59(1H, m), 3.88(1H, m), 5.20-5.49(2H, m), 6.66(1H, d, J = 7.0Hz), 6.92(2H, d, J = 8.6Hz), 7.47(2H, d, J = 8.6Hz), 7.59(2H, d, J = 8.6Hz), 7.79(2H, d, J = 8.2Hz).

IR(Nujol): 3598, 3175, 2725, 1696, 1635, 1601, 1531, 1510/cm.

[α]_D²⁰ = +99.8° (CH₃OH, c = 1.011, 25°C)

No. 1m-19

CDCl₃, 300MHz

1.05-2.20(14H, m), 2.32(2H, t, J = 7.4Hz), 2.61(1H, m), 3.68(2H, s), 3.88(2H, s), 3.94(1H, m), 5.30-5.50(2H, m), 6.24(1H, d, J = 7.0Hz), 6.99(2H, d, J = 8.6Hz), 7.53-7.62(4H, m), 7.82(2H, d, J = 8.6Hz).

IR(CHCl₃): 3440, 3006, 2946, 2875, 1726, 1649, 1606, 1527, 1510, 1489/cm.

[α]_D²⁰ = +68° (CHCl₃, c = 0.88, 25°C)

No. 1m-20

CDCl₃, 300MHz

1.09-2.20(14H, m), 2.35(2H, t, J = 7.2Hz), 2.58(1H, m), 3.85(2H, s), 3.89(1H, m), 5.2-5.48(2H, m), 6.25(1H, d, J = 7.2Hz), 6.98(2H, d, J = 8.6Hz), 7.51-7.61(4H, m), 7.81(

2H, d, J=9.4Hz), 8.84(1H, brs).
IR(CHCl₃): 8446, 8012, 2952, 2881, 2640, 1780(ab), 1707, 1647, 1606, 1527, 1510, 1489/cm.
[α]_D²⁰ = +53° (CHCl₃, c=1.00, 25°C).

No. 1m-21
CDCl₃, 300MHz
1.05-2.14(14H, m), 2.37(2H, t, J=7.2Hz), 2.51(1H, m), 3.81(1H, m), 5.24-5.46 H, m), 6.11(1H, d, J=7.5Hz), 7.32-7.48(3H, m), 7.53-7.55(2H, m).
IR(CHCl₃): 8420, 8250, 8008, 2948, 2870, 2640, 2210, 1735(ab), 1705, 1645, 1503, 1441, 1409/cm.
[α]_D²⁰ = +59.2 ± 1.0° (CHCl₃, c=1.023, 22°C).

No. 1m-22
CDCl₃, 300MHz
1.05-2.17(14H, m), 2.37(2H, t, J=7.2Hz), 2.52(1H, m), 3.82(1H, m), 5.32-5.47(2H, m), 6.20(1H, d, J=7.6Hz), 7.38-7.53(3H, m), 7.58-7.61(2H, m), 9.11(1H, brs).
IR(CHCl₃): 8420, 8250, 8010, 2954, 2870, 2675, 2208, 1780(ab), 1705, 1640, 1500, 1406/cm.
[α]_D²⁰ = +57.4° (CHCl₃, c=1.83, 23°C).

No. 1m-23
CDCl₃, 300MHz
1.05-2.18(14H, m), 2.31(2H, t, J=7.5Hz), 2.60(1H, m), 3.83(2H, s), 3.90(1H, m), 5.3-5.47(2H, m), 6.22(1H, d, J=6.9Hz), 7.40-7.49(2H, m), 7.76-7.79(2H, m).
IR(CHCl₃): 8436, 8008, 2946, 2868, 1727, 1651, 1603, 1585, 1512, 1484/cm.
[α]_D²⁰ = +52° (CHCl₃, c=1.48, 25°C).

No. 1m-24
CDCl₃, 300MHz
1.05-2.21(14H, m), 2.36(2H, t, J=7.2Hz), 2.57(1H, m), 3.89(1H, m), 5.25-5.47(2H, m), 6.22(1H, d, J=7.0Hz), 7.39-7.55(3H, m), 7.73-7.79(2H, m).
IR(CHCl₃): 8678, 8572, 8486, 8010, 2948, 2875, 1730(ab), 1709, 1650, 1600, 1580, 1514, 1484/cm.
[α]_D²⁰ = +57° (CHCl₃, c=0.97, 26°C).

No. 1m-25
CDCl₃, 300MHz
1.04-2.18(14H, m), 2.38-2.35(5H, m), 2.59(1H, m), 3.62(2H, s), 3.88(1H, m), 5.29-5.49(2H, m), 6.30(1H, d, J=7.2Hz), 7.15(2H, d, J=9.0Hz), 7.50(2H, d, J=8.8Hz).
IR(CHCl₃): 8486, 8010, 2946, 2868, 1752, 1727, 1653, 1602, 1519, 1491/cm.
[α]_D²⁰ = +58° (CHCl₃, c=1.68, 25°C).

No. 1m-26
CDCl₃, 300MHz
1.05-2.19(14H, m), 2.32-2.38(5H, m), 2.56(1H, m), 3.88(1H, m), 5.29-5.47(2H, m), 6.25(1H, d, J=7.4Hz), 7.15(2H, d, J=9.0Hz), 7.78(2H, d, J=8.6Hz).
IR(CHCl₃): 8484, 8016, 8006, 2948, 2880, 2822, 1752, 1780(ab), 1710, 1651, 1605, 1520, 1492/cm.
[α]_D²⁰ = +58° (CHCl₃, c=3.68, 24°C).

No. 1m-27
CDCl₃, 300MHz
1.05-2.16(14H, m), 2.30(2H, t, J=7.5Hz), 2.57(1H, m), 3.62(2H, s), 3.97(1H, m), 5.2-5.47(2H, m), 6.32(1H, d, J=7.4Hz), 6.55(2H, d, J=8.6Hz), 7.42 H, d, J=8.6Hz), 8.85(1H, s).
IR(CHCl₃): 8580, 8450, 8216, 8010, 2948, 2868, 1728, 1640, 1608, 1584, 1528, 1498/cm.

$[\alpha]_D^{25} = +55.2^\circ$ ($\text{CHCl}_3, c = 0.718, 23^\circ\text{C}$)

No. 1m-28

CDCl_3 , 300MHz

1.10-2.25(14H, m), 2.82(2H, t, $J = 7.2\text{Hz}$), 2.55(1H, brs), 3.82-3.98(1H, m), 5.27-5.47(2H, m), 6.25(1H, d, $J = 7.4\text{Hz}$), 6.86(2H, d, $J = 8.6\text{Hz}$), 7.62(2H, d, $J = 8.6\text{Hz}$).

IR(CHCl_3): 3435, 3342, 2975, 1730(ab), 1706, 1639, 1607, 1585/ cm^{-1} .

No. 1m-29

CDCl_3 , 300MHz

1.05-2.18(14H, m), 2.81(2H, t, $J = 7.4\text{Hz}$), 2.58(1H, m), 3.64(3H, s), 3.85(3H, s), 3.89(1H, m), 5.29-5.48(2H, m), 6.14(1H, d, $J = 8.6\text{Hz}$), 6.92(2H, d, $J = 9.0\text{Hz}$), 7.74(2H, d, $J = 9.0\text{Hz}$).

IR(CHCl_3): 3445, 3005, 2946, 2868, 1737, 1646, 1606, 1578, 1523, 1492/ cm^{-1} .

$[\alpha]_D^{25} = +53^\circ$ ($\text{CHCl}_3, c = 2.03, 24^\circ\text{C}$)

No. 1m-30

CDCl_3 , 300MHz

1.04-2.21(14H, m), 2.86(2H, t, $J = 7.8\text{Hz}$), 2.56(1H, m), 3.65(3H, s), 3.88(1H, m), 5.27-5.46(2H, m), 6.15(1H, d, $J = 7.2\text{Hz}$), 6.92(2H, d, $J = 8.6\text{Hz}$), 7.72(2H, d, $J = 8.6\text{Hz}$).

IR(CHCl_3): 3440, 3010, 2950, 2870, 2645, 1727, 1710(ab), 1646, 1606, 1575, 1524, 1494/ cm^{-1} .

$[\alpha]_D^{25} = +62^\circ$ ($\text{CHCl}_3, c = 1.10, 24^\circ\text{C}$).

No. 1m-31

$\text{CDCl}_3 + \text{CD}_3\text{OD}$ 300MHz

1.16-2.30(14H, m), 2.81(2H, t, $J = 7.2\text{Hz}$), 2.59(1H, m), 3.55(1H, m), 5.31-5.51(2H, m), 7.13-7.21(1H, m), 7.31-7.42(2H, m), 7.86-7.93(2H, m).

IR(CHCl_3): 3344, 3175, 2715, 2675, 1699, 1631, 1566/ cm^{-1} .

$[\alpha]_D^{25} = +67^\circ$ ($\text{CH}_3\text{OH}, c = 1.01, 24^\circ\text{C}$).

No. 1m-32

CDCl_3 , 300MHz

1.09-2.28(14H, m), 2.83(2H, t, $J = 7.1\text{Hz}$), 2.57(1H, brs), 3.40-3.98(3H, m), 4.41(1H, brs), 5.29-5.45(2H, m), 6.44(1H, d, $J = 7.4\text{Hz}$), 7.43(2H, d, $J = 8.2\text{Hz}$), 7.80(2H, d, $J = 7.8\text{Hz}$).

IR(CHCl_3): 3434, 3354, 1726, 1720(ab), 1660(ab), 1636/ cm^{-1} .

No. 1m-33

CDCl_3 , 200MHz

1.14-2.25(14H, m), 2.57(2H, t, $J = 7.3\text{Hz}$), 2.64(1H, brs), 3.93-4.01(1H, m), 5.30-5.51(2H, m), 6.47(1H, d, $J = 7.4\text{Hz}$), 7.62-7.74(2H, m), 7.79(2H, s), 7.89-7.93(1H, m), 8.00(1H, dd, $J = 2.3, 1.0\text{Hz}$), 8.30(1H, d, $J = 1.0\text{Hz}$), 8.65-8.72(2H, m).

IR(CHCl_3): 3450, 3375, 1728, 1707, 1649, 1528, 1509/ cm^{-1} .

$[\alpha]_D^{25} = +52.8 \pm 1.2^\circ$ ($\text{CHCl}_3, c = 1.01, 23^\circ\text{C}$).

No. 2a-1

$[\alpha]_D^{25} = +69.0^\circ$ ($\text{MeOH}, c = 1.01, 25^\circ\text{C}$)

No. 2a-2

CDCl_3 , 300MHz

0.99(1H, d, $J = 10.2\text{Hz}$), 1.15 H 1.24(2H, s), 1.50-2.50(14H, m), 4.30(1H, m), 5.35-5.52(2H, m), 6.32(1H, d, $J = 8.7\text{Hz}$), 7.38-7.49(2H, m), 7.58-7.62(2H, m), 7.66 H 7.80(2H, s), 7.80(2H, s), 7.80(2H, s), 7.80(2H, s).

IR(CHCl_3): 3116, 3014, 2925, 2870, 2663, 1708, 1651, 1610, 1524, 1504, 1484, 1473/ cm^{-1} .

$[\alpha]_D^{25} = +54.1^\circ$ ($\text{MeOH}, c = 1.02, 25^\circ\text{C}$).

No.2a-3

$[\alpha]_D^{25} = +78.6^\circ$ (MeOH, c=1.15, 25°C).

No.2a-4

CDCl₃, 300MHz

.99(1H, d, J=10.2Hz), 1.18 ㉞ 1.25(㉞㉞ 2H, ㉞㉞ a), 1.64-2.51(14H, m), 4.3
1(1H, m), 5.86-5.88(2H, m), 6.22(1H, d, J=8.4s), 7.50-7.56(2H, m), 7.85-7.98(6H,
m).

IR(CHCl₃): 8515, 8452, 3014, 2925, 2870, 1740, 1702, 1634, 1517, 1488, 147 /cm.

$[\alpha]_D^{25} = +79.5^\circ$ (MeOH, c=1.15, 22°C).

No.2a-5

CD₃OD 300MHz

0.98(1H, d, J=9.9Hz), 1.18 ㉞ 1.25(㉞㉞ 3H, ㉞㉞ a), 1.56-1.71(8H, m), 1.98-2.
40(11H, m), 4.17(1H, m), 5.41-5.52(2H, m), 7.52-7.61(3H, m), 7.91-8.01(6H, m).

IR(KBr): 8418, 3069, 2983, 2921, 2869, 1704, 1642, 1566, 1518, 1488, 1408 /cm.

$[\alpha]_D^{25} = +62.0^\circ$ (MeOH, c=1.00, 25°C).

No.2a-6

$[\alpha]_D^{25} = +64.1^\circ$ (MeOH, c=1.01, 25°C).

No.2a-7

$[\alpha]_D^{25} = +65.3^\circ$ (MeOH, c=0.99, 25°C).

No.2a-8

$[\alpha]_D^{25} = +74.0^\circ$ (MeOH, c=1.01, 25°C).

No.2a-9

$[\alpha]_D^{25} = +71.0^\circ$ (MeOH, c=1.10, 25°C).

No.2a-10

$[\alpha]_D^{25} = +74.7^\circ$ (MeOH, c=1.00, 25°C).

No.2a-11

$[\alpha]_D^{25} = +72.1^\circ$ (MeOH, c=1.00, 25°C).

No.2a-12

$[\alpha]_D^{25} = +52.1^\circ$ (CHCl₃, c=1.01, 25°C).

m.p. 155.0-156.0°C

No.2a-13

CDCl₃, 300MHz

0.98(1H, d, J=10.2Hz), 1.18 ㉞ 1.25(㉞㉞ 3H, ㉞㉞ a), 1.63-2.40(14H, m), 4.3
0(1H, m), 5.46-5.56(2H, m), 6.44(1H, d, J=8.4Hz), 7.49 ㉞ 7.77(㉞㉞ 2H, ㉞㉞
d, J=8.7Hz), 7.54(1H, s).

IR(CHCl₃): 3689, 3378, 3028, 3014, 2924, 1718, 1652, 1602, 1522, 1498 /cm.

$[\alpha]_D^{25} = +78.3^\circ$ (MeOH, c=0.84, 25°C).

m.p. 205.0-206.0°C

No.2a-14

$[\alpha]_D^{25} = +72.5^\circ$ (MeOH, c=1.07, 25°C).

No.2a-15

CDCl₃, 300MHz

0.99(1H, d, J=9.9Hz), 1.14 ㉞ 1.24(㉞㉞ 3H, ㉞㉞ a), 1.55-2.44(14H, m), 4.27(
1H, m), 5.30-5.50(2H, m), 6.29(1H, d, J=9.0Hz), 7.11 ㉞ 7.20(㉞㉞ 1H, ㉞㉞ d,
J=16.2Hz), 7.39-7.55(6H, m), 7.57 ㉞ 7.72(㉞㉞ 2H, ㉞㉞ d, J=8.7Hz).

IR(CHCl₃): 8452, 3023, 3022, 3015, 2925, 2870, 1708, 1650, 1607, 1560, 1522, 1496

/cm.

$[\alpha]_D^{25} = +72.8^\circ$ (MeOH, $c=1.00, 27^\circ$).

m.p. 115.0-117.0°C

No. 2a-16

CDCl₃, 800MHz

0.92(1H, d, J=10.2Hz), 1.11 (1.23(2H, s), 1.50-2.46(14H, m), 2.6
2(3H, s), 4.29(1H, m), 5.35-5.50(2H, m), 6.30(1H, d, J=8.7Hz), 6.59 (6.68 (2H, s), 7.23(5H, s), 7.39 (7.59(2H, s), 7.74(2H, s), 7.83(2H, s), 7.91(1H, dt, J=1.5 and 7.8Hz), 8.01(1H, dt, J=1.5 and 7.8Hz), 8.18(1H, t, J=1.5Hz).

IR(CHCl₃): 3453, 3024, 3016, 2924, 2870, 1730, 1651, 1607, 1520, 1495 /cm.

$[\alpha]_D^{25} = +56.8^\circ$ (MeOH, $c=1.04, 24^\circ$).

No. 2a-17

CDCl₃, 800MHz

0.97(1H, d, J=10.2Hz), 1.11 (1.23(2H, s), 1.50-2.38(14H, m), 4.2
6(1H, m), 5.30-5.50(2H, m), 6.23(1H, d, J=8.4Hz), 6.59 (6.70(2H, s), 7.23(5H, s), 7.39 (7.57(2H, s), 7.74(2H, s), 7.83(2H, s), 7.91(1H, dt, J=1.5 and 7.8Hz), 8.01(1H, dt, J=1.5 and 7.8Hz), 8.18(1H, t, J=1.5Hz).

IR(CHCl₃): 3452, 3051, 3019, 3014, 2925, 2870, 2865, 1708, 1650, 1607, 1521, 1495 /cm.

/cm.

$[\alpha]_D^{25} = +61.6^\circ$ (MeOH, $c=1.00, 27^\circ$).

No. 2a-18

CDCl₃, 800MHz

0.97(1H, d, J=10.2Hz), 1.11 (1.23(2H, s), 1.50-2.50(14H, m), 3.61
(3H, s), 4.21(1H, m), 5.35-5.51(2H, m), 6.23(1H, d, J=8.4Hz), 7.48-7.64(4H, m), 7.7
9-7.83(2H, m), 7.91(1H, dt, J=1.5 and 7.8Hz), 8.01(1H, dt, J=1.5 and 7.8Hz), 8.18(1H, t, J=1.5Hz).

IR(CHCl₃): 3450, 3026, 3018, 2925, 2870, 1730, 1659, 1600, 1510 /cm.

$[\alpha]_D^{25} = +56.0^\circ$ (MeOH, $c=1.01, 25^\circ$).

No. 2a-19

CDCl₃, 800MHz

0.95(1H, d, J=9.9Hz), 1.14 (1.21(2H, s), 1.53-2.60(14H, m), 4.25(1H, m), 5.25-5.64(2H, m), 7.21(1H, d, J=8.5Hz), 7.49-7.68(4H, m), 7.76-7.84(2H, m), 7.91(1H, dt, J=1.5 and 7.8Hz), 8.01(1H, dt, J=1.5 and 7.8Hz), 8.18(1H, t, J=1.5Hz).

IR(CHCl₃): 3382, 3180, 3025, 3015, 2925, 2870, 1726, 1652, 1599, 1577, 1521 /cm.

$[\alpha]_D^{25} = +55.9^\circ$ (MeOH, $c=1.00, 25^\circ$).

No. 2a-20

CDCl₃, 800MHz

0.98(1H, d, J=10.2Hz), 1.13 (1.24(2H, s), 1.50-2.50(14H, m), 3.6
2(3H, s), 4.31(1H, m), 5.35-5.51(2H, m), 6.24(1H, d, J=8.4Hz), 7.40-7.52(3H, m), 7.71-7.76(2H, m), 7.91(1H, dt, J=1.5 and 7.8Hz), 8.01(1H, dt, J=1.5 and 7.8Hz), 8.18(1H, t, J=1.5Hz).

IR(CHCl₃): 3453, 3025, 3018, 2925, 2870, 1730, 1753, 1578, 1514, 1488 /cm.

$[\alpha]_D^{25} = +61.2^\circ$ (MeOH, $c=1.04, 25^\circ$).

No. 2a-21

CDCl₃, 800MHz

0.98(1H, d, J=10.2Hz), 1.13 (1.23(2H, s), 1.52-2.50(14H, m), 4.2
8(1H, m), 5.34-5.51(2H, m), 6.27(1H, d, J=8.7Hz), 7.41-7.68(3H, m), 7.71-7.74(2H, m), 7.91(1H, dt, J=1.5 and 7.8Hz), 8.01(1H, dt, J=1.5 and 7.8Hz), 8.18(1H, t, J=1.5Hz).

IR(CHCl₃): 3452, 3068, 3027, 3014, 2925, 2871, 1708, 1652, 1578, 1515, 1488 /cm.

$[\alpha]_D^{25} = +62.0^\circ$ (MeOH, $c=1.01, 27^\circ$).

No. 2a-22

d₆-DMSO 800MHz

0.86(1H, d, J=9.9Hz), 1.10 (1.16(2H, s), 1.42-1.52(3H, m), 1.85-2.05(14H, m), 3.61(3H, s), 4.21(1H, m), 5.35-5.51(2H, m), 6.23(1H, d, J=8.4Hz), 7.48-7.64(4H, m), 7.79-7.83(2H, m), 7.91(1H, dt, J=1.5 and 7.8Hz), 8.01(1H, dt, J=1.5 and 7.8Hz), 8.18(1H, t, J=1.5Hz).

4.8(1H,m), 3.98(1H,m), 5.22-5.43(2H,m), 7.41(3H,m), 7.88(2H,d,J=8.5Hz), 8.19(1H,d,J=6.5Hz).

IR(KBr): 3357, 3060, 2984, 2922, 2868, 1634, 1563, 1529, 1487/cm.

$[\alpha]_D^{25} = +47.7^\circ$ (MeOH, c=1.00, 25°C).

No. 2a-22

$[\alpha]_D^{25} = +62.7^\circ$ (MeOH, c=1.01, 27°C).

No. 2a-24

CDCl₃, 300MHz

0.99(1H,d,J=10.2Hz), 1.14 (s) 1.25(2H, s), 1.52-2.50(14H,m), 4.3(1H,m), 5.36-5.52(2H,m), 6.34(1H,d,J=8.4Hz), 7.47-7.52(2H,m), 7.59-7.64(1H,m), 7.78-7.83(3H,m).

IR(CHCl₃): 3449, 3027, 3018, 2925, 2869, 1708, 1656, 1599, 1518, 1493 /cm.

$[\alpha]_D^{25} = +63.1^\circ$ (MeOH, c=1.00, 25°C).

No. 2a-25

$[\alpha]_D^{25} = +35.1^\circ$ (MeOH, c=1.00, 25°C).

No. 2a-26

$[\alpha]_D^{25} = +35.5^\circ$ (MeOH, c=1.02, 25°C).

No. 2a-27

CDCl₃, 300MHz

0.97(1H,d,J=10.2Hz), 1.12 (s) 1.23(2H, s), 1.52-2.50(14H,m), 3.6(3H,s), 4.29(1H,m), 5.36-5.51(2H,m), 6.18(1H,d,J=8.4Hz), 7.01 (s) 7.71 (2H, s), 7.84-7.91(2H,m), 7.98-8.05(2H,m), 7.16(1H,t,J=7.5Hz), 7.34-7.41(2H,m).

IR(CHCl₃): 3455, 3024, 3016, 2924, 2870, 1730, 1651, 1588, 1520, 1457 /cm.

$[\alpha]_D^{25} = +36.4^\circ$ (MeOH, c=1.01, 25°C).

No. 2a-28

CDCl₃, 300MHz

0.98(1H,d,J=10.2Hz), 1.12 (s) 1.23(2H, s), 1.52-2.50(14H,m), 4.3(1H,m), 5.34-5.51(2H,m), 6.20(1H,d,J=9.0Hz), 7.01 (s) 7.70(2H, s), 7.84-7.90(2H,m), 7.17(1H,t,J=7.5Hz), 7.34-7.40(2H,m).

IR(CHCl₃): 3454, 3021, 3018, 2926, 2870, 1708, 1650, 1588, 1528, 1457/cm.

$[\alpha]_D^{25} = +36.2^\circ$ (MeOH, c=1.00, 25°C).

No. 2a-29

$[\alpha]_D^{25} = +33.0^\circ$ (MeOH, c=1.03, 25°C).

No. 2a-30

CDCl₃, 300MHz

0.97(1H,d,J=10.2Hz), 1.10 (s) 1.29(2H, s), 1.52-2.50(14H,m), 4.2(1H,m), 5.30-5.50(2H,m), 6.23(1H,d,J=6.7Hz), 6.86(1H,s), 7.36-7.39(10H,m), 7.60 (s) 7.68(2H, s), 7.84-7.91(2H,m), 7.17(1H,t,J=7.5Hz), 7.34-7.40(2H,m).

IR(CHCl₃): 3451, 3058, 3064, 3029, 3014, 2925, 2869, 1707, 1652, 1522, 1495 /cm.

$[\alpha]_D^{25} = +54.2^\circ$ (MeOH, c=1.00, 25°C).

No. 2a-31

CDCl₃, 300MHz

0.98(1H,d,J=10.2Hz), 1.14 (s) 1.24(2H, s), 1.50-2.50(14H,m), 3.6(3H,s), 4.31(1H,m), 5.30-5.50(2H,m), 6.26(1H,d,J=8.4Hz), 6.90(1H,t,J=7.4Hz), 7.13(1H,d,J=8.7Hz), 7.29(2H,t,J=8.0Hz), 7.57-7.76(5H,m), 7.82(1H,s).

IR(ν_{max}): 3380, 3244, 1723, 1633, 1601, 1578, 1525, 1495 /cm.

$[\alpha]_D^{25} = +71.6^\circ$ (MeOH, c=0.50, 25°C).

m.p. 133.0-134.0°C

No.2a-22

$[\alpha]_D^{25} = +56.1^\circ$ (MeOH, c=1.02, 25°C).

No.2a-23

CDCl_3 , 800MHz

0.95(1H, d, J=10.2Hz), 1.10 δ 1.21(2x2 3H, 2x2 e), 1.50-2.50(14H, m), 4.25 (1H, m), 5.13(2H, e), 5.30-5.70(3H, m), 6.41(1H, d, J=8.2Hz), 6.89(1H, e), 7.09(1H, e), 7.17 δ 7.73(2x2 2H, 2x2 d, J=8.2Hz), 7.82(1H, e).

IR(CHCl₃): 3450, 3125, 3081, 3018, 2925, 2870, 2467, 1917, 1708, 1654, 1615, 1575, 1523, 1497 /cm.

$[\alpha]_D^{25} = +55.2^\circ$ (MeOH, c=1.01, 25°C).

No.2a-24

$[\alpha]_D^{25} = +72.9^\circ$ (MeOH, c=1.03, 25°C).

No.2a-25

CDCl_3 , 800MHz

0.98(1H, d, J=10.2Hz), 1.13 δ 1.24(2x2 3H, 2x2 e), 1.52-2.48(14H, m), 4.2 8(1H, m), 5.35-5.51(2H, m), 6.28(1H, d, J=8.7Hz), 7.34-7.37(3H, m), 7.52-7.55(2H, m), 7.58 and 7.71(2x2 2H, 2x2 d, J=8.7Hz).

IR(CHCl₃): 3515, 3452, 3030, 3012, 2925, 2870, 1739, 1708, 1652, 1607, 1555, 1521, 1497 /cm.

$[\alpha]_D^{25} = +74.8^\circ$ (MeOH, c=1.01, 25°C).

No.2a-26

$[\alpha]_D^{25} = +23.4^\circ$ (MeOH, c=1.07, 25°C).

No.2a-27

CDCl_3 , 800MHz

0.82(1H, d, J=10.5Hz), 0.95 δ 1.18(2x2 3H, 2x2 e), 1.44-2.46(14H, m), 3.9 2(1H, m), 5.34-5.52(3H, m), 7.36-7.54(3H, m), 7.62(1H, e).

IR(CHCl₃): 3482, 3310, 3182, 3025, 3014, 2924, 2870, 1704, 1610, 1594, 1523, 1487 /cm.

$[\alpha]_D^{25} = +25.3^\circ$ (MeOH, c=1.00, 25°C).

No.2a-28

$[\alpha]_D^{25} = +70.9^\circ$ (MeOH, c=1.02, 25°C).

No.2a-29

$[\alpha]_D^{25} = +70.6^\circ$ (MeOH, c=1.01, 25°C).

No.2a-40

$[\alpha]_D^{25} = +74.7^\circ$ (MeOH, c=1.00, 25°C).

No.2a-41

$[\alpha]_D^{25} = +72.1^\circ$ (MeOH, c=1.01, 24°C).

No.2a-42

$[\alpha]_D^{25} = +69.2^\circ$ (MeOH, c=1.00, 25°C).

No.2a-43

$[\alpha]_D^{25} = +70.8^\circ$ (MeOH, c=1.00, 25°C).

No.2a-44

$[\alpha]_D^{25} = +80.4^\circ$ (MeOH, c=1.00, 25°C).

No.2a-45

CDCl₃, 300MHz

0.97(1H,d,J=9.9Hz), 1.13 δ 1.23(zz 3H, zz a), 1.55-2.52(14H,m), 4.29(1H,m), 5.34-5.64(2H,m), 6.32(1H,d,J=9.0Hz), 7.10(1H,t,J=7.4Hz), 7.34(2H,t,J=7.4Hz), 7.52(2H,m), 7.66 δ 7.75(zz 3H, zz d,J=8.4Hz), 7.80(1H,s), 8.10(1H,s), 10.09(1H,s).

IR(CHCl₃): 2893, 2195, 2093, 2023, 2019, 2925, 2870, 1698, 1656, 1598, 1537, 1498 /cm.

[α]_D=+59.4° (MeOH, c=1.01, 24°C).

No. 2a-46

[α]_D=+53.5° (MeOH, c=1.00, 25°C).

No. 2a-47

CDCl₃, 300MHz

0.97(1H,d,J=9.9Hz), 1.13 δ 1.23(zz 3H, zz a), 1.54-2.48(14H,m), 4.29(1H,m), 5.35-5.52(2H,m), 6.32(1H,d,J=8.7Hz), 7.36(1H,m), 7.41(2H,t,J=7.5Hz), 7.64(2H,d,J=7.5Hz), 7.73 δ 7.77(zz 3H, zz d,J=8.4Hz), 7.95(1H,s), 9.20(1H,s), 10.38(1H,s).

IR(CHCl₃): 2450, 2339, 2003, 1992, 1925, 2870, 1706, 1653, 1596, 1523, 1495/cm.

[α]_D=+62.2° (MeOH, c=1.00, 25°C).

No. 2a-48

[α]_D=+63.5° (MeOH, c=1.00, 24°C).

No. 2a-49

CDCl₃, 300MHz

1.00(1H,d,J=10.5Hz), 1.17 δ 1.26(zz 3H, zz a), 1.55-2.52(14H,m), 4.34(1H,m), 5.38-5.54(2H,m), 6.35(1H,d,J=9.0Hz), 7.50-7.62(3H,m), 7.90 δ 8.33(zz 2H, zz d,J=8.4Hz), 8.21(2H,m).

IR(CHCl₃): 2451, 2029, 2022, 2016, 2925, 2870, 1708, 1655, 1542, 1508, 1492, 1471, 1459 /cm.

[α]_D=+62.5° (MeOH, c=1.02, 25°C).

m.p. 135.0-137.0°C

No. 2a-50

[α]_D=+68.9° (MeOH, c=1.01, 24°C).

No. 2a-51

d₆-DMSO 300MHz

0.87(1H,d,J=9.9Hz), 1.10 δ 1.17(zz 3H, zz a), 1.40-1.60(3H,m), 1.90-2.40(11H,m), 2.98(1H,m), 5.35-5.46(2H,m), 7.64(1H,s), 7.65 δ 7.91(zz 2H, zz d,J=8.7Hz), 8.06(1H,d,J=6.0Hz), 9.22(1H,brs).

IR(KBr): 2385, 2962, 1734, 1707, 1622, 1529, 1498 /cm.

[α]_D=+68.4° (MeOH, c=1.01, 24°C).

No. 2a-52

[α]_D=+76.2° (MeOH, c=1.01, 24°C).

No. 2a-53

[α]_D=+73.9° (MeOH, c=1.02, 24°C).

No. 2a-54

[α]_D=+68.1° (MeOH, c=1.00, 24°C).

No. 2a-55

[α]_D=+67.8° (MeOH, c=1.00, 24°C).

No. 2a-56

$[\alpha]_D^{25} = +85.4^\circ$ (MeOH, c=1.03, 25°C).

No. 2a-57

$[\alpha]_D^{25} = +63.4^\circ$ (MeOH, c=1.01, 24°C).

No. 2a-58

$[\alpha]_D^{25} = +66.6^\circ$ (MeOH, c=1.01, 24°C).

No. 2a-59

$[\alpha]_D^{25} = +65.5^\circ$ (MeOH, c=1.00, 24°C).

No. 2a-60

$[\alpha]_D^{25} = +60.9^\circ$ (MeOH, c=1.02, 25°C).

No. 2a-61

$CDCl_3$, 300MHz

0.97(1H, d, J=10.0Hz), 1.10 δ 1.22(각각 3H, 각각 a), 1.50-2.50(14H, m), 4.2
6(1H, m), 5.30-5.54(2H, m), 5.28(1H, d, J=8.6Hz), 5.60 δ 5.82(각각 1H, 각각
d, J=12.4Hz), 7.12(2H, d, J=8.0Hz), 7.26 δ 7.82(각각 2H, 각각 d, J=8.6Hz
) 8.47(2H, d, J=6.0Hz).

IR(CHCl₃): 8452, 8027, 3019, 3018, 2925, 2870, 2480, 1708, 1651, 1608, 1520, 1494
/cm.

$[\alpha]_D^{25} = +61.6^\circ$ (MeOH, c=1.01, 25°C).

No. 2a-62

$[\alpha]_D^{25} = +72.0^\circ$ (MeOH, c=0.93, 25°C).

No. 2a-63

$CDCl_3$, 300MHz

0.99(1H, d, J=10.3Hz), 1.14 δ 1.24(각각 3H, 각각 a), 1.50-2.50(14H, m), 4.2
9(1H, m), 5.36-5.55(2H, m), 5.35(1H, d, J=9.1Hz), 7.04 δ 7.27(각각 1H, 각각
d, J=16.5Hz), 7.37(2H, d, J=6.6Hz), 7.56 δ 7.76(각각 2H, 각각 d, J=8.4Hz),
8.57(2H, d, J=6.6Hz).

IR(CHCl₃): 3452, 3024, 3018, 3014, 2925, 2870, 2470, 1928, 1709, 1652, 1605, 1521,
1496 /cm.

$[\alpha]_D^{25} = +69.2^\circ$ (MeOH, c=1.01, 25°C).

No. 2a-64

$[\alpha]_D^{25} = +58.9^\circ$ (MeOH, c=1.24, 25°C).

No. 2a-65

$CDCl_3$, 300MHz

0.98(1H, d, J=10.5Hz), 1.12 δ 1.23(각각 3H, 각각 a), 1.54-2.46(14H, m), 4.2
7(1H, m), 5.22(2H, s), 5.34-5.52(2H, m), 5.28(1H, d, J=8.4Hz), 7.32-7.45(5H, m), 7.
64 δ 7.71(각각 2H, 각각 d, J=8.4Hz), 8.15(1H, s).

IR(CHCl₃): 8452, 8088, 8065, 8032, 3013, 2925, 2870, 1708, 1653, 1611, 1559, 1522,
1496 /cm.

$[\alpha]_D^{25} = +61.0^\circ$ (MeOH, c=0.91, 25°C).

No. 2a-66

$[\alpha]_D^{25} = +76.0^\circ$ (MeOH, c=1.01, 25°C).

No. 2a-67

$CDCl_3$, 300MHz

0.98(1H, d, J=10.4Hz), 1.14 δ 1.24(각각 3H, 각각 a), 1.54-2.46(14H, m), 4.2
8(1H, m), 5.22-5.53(2H, m), 5.27(1H, d, J=8.6Hz), 5.92-7.51(각각 1H, 각각 d, J=
16.4Hz), 7.02(1H, dd, J=5.8 δ 8.6Hz), 7.12(1H, d, J=8.6Hz), 7.24(1H, d, J=5.8
Hz), 7.51 δ 7.70(각각 2H, 각각 d, J=8.4Hz).

IR(CHCl₃): 8453, 8039, 3018, 2925, 2870, 1739, 1650, 1604, 1524, 1515, 1494 /cm.
[α]_D²⁵ = +76.2° (MeOH, c=1.00, 25°C).
m.p. 104.0-108.0°C

No. 2a-68

[α]_D²⁵ = +57.7° (MeOH, c=1.01, 25°C).

No. 2a-6

CDCl₃, 300MHz

0.99(1H, d, J=10.2Hz), 1.14 ㉞ 1.24(㉞㉞ 3H, ㉞㉞ a), 1.54-2.48(14H, m), 4.2
8(1H, m), 5.34-5.53(2H, m), 6.29(1H, d, J=9.0Hz), 6.54-6.74(㉞㉞ 1H, ㉞㉞ d, J=
12.0Hz), 7.02(1H, dd, J=4.8 ㉞ 3.3Hz), 6.97(1H, dd, J=8.3 ㉞ 1.2Hz), 7.18(1
H, dd, J=4.8 ㉞ 1.2Hz), 7.44 ㉞ 7.70(㉞㉞ 2H, ㉞㉞ d, J=8.7Hz).

IR(CHCl₃): 3453, 3023, 3010, 2925, 2870, 1705, 1650, 1607, 1559, 1525, 1492 /cm.
[α]_D²⁵ = +58.4° (MeOH, c=1.00, 25°C).

No. 2a-70

[α]_D²⁵ = +48.8° (MeOH, c=1.00, 25°C).

No. 2a-71

CDCl₃, 300MHz

0.98(1H, d, J=10.2Hz), 1.12 ㉞ 1.23(㉞㉞ 3H, ㉞㉞ a), 1.52-2.48(14H, m), 2.3
1(3H, s), 4.26(1H, m), 5.38-5.52(2H, m), 6.20(1H, d, J=9.3Hz), 7.02-7.11(8H, m), 7.
70(2H, d, J=9.0Hz).

IR(CHCl₃): 3460, 3031, 3022, 3011, 2925, 2870, 1750, 1708, 1650, 1608, 1597, 1523,
1490 /cm.
[α]_D²⁵ = +48.9° (MeOH, c=1.01, 25°C).

No. 2a-72

[α]_D²⁵ = +51.3° (MeOH, c=1.02, 25°C).

No. 2a-73

CDCl₃, 300MHz

0.97(1H, d, J=9.8Hz), 1.11 ㉞ 1.23(㉞㉞ 3H, ㉞㉞ a), 1.54-2.48(14H, m), 4.27(
1H, m), 5.32-5.52(2H, m), 6.24(1H, d, J=9.0Hz), 6.83-6.94(6H, m), 7.65(2H, d, J=9.
0Hz).

IR(CHCl₃): 3595, 3461, 3199, 3032, 3012, 2925, 2870, 1708, 1642, 1604, 1524, 1507,
1491 /cm.
[α]_D²⁵ = +52.2° (MeOH, c=1.01, 25°C).

No. 2a-74

[α]_D²⁵ = +51.5° (MeOH, c=0.92, 25°C).

No. 2a-75

CDCl₃, 300MHz

0.97(1H, d, J=10.2Hz), 1.11 ㉞ 1.23(㉞㉞ 3H, ㉞㉞ a), 1.55-2.48(14H, m), 3.8
2(3H, s), 4.35(1H, m), 5.32-5.52(2H, m), 6.19(1H, d, J=9.7Hz), 6.89-7.01(6H, m), 7.
65-7.68(2H, m).

IR(CHCl₃): 3450, 3025, 3008, 2925, 2870, 2837, 1741, 1649, 1612, 1521, 1505, 1490
/cm.
[α]_D²⁵ = +51.1° (MeOH, c=1.00, 25°C).

No. 2a-76

[α]_D²⁵ = +60.4° (MeOH, c=0.98, 25°C).

No. 2a-77

CDCl₃, 300MHz

0.99(1H, d, J=10.5Hz), 1.15 ㉞ 1.24(㉞㉞ 3H, ㉞㉞ a), 1.54-2.48(14H, m), 2.3

4.29(1H,m), 5.32-5.54(2H,m), 6.32(1H,d,J=8.4Hz), 7.19 및 7.80 (각각 2H, 각각 d,J=8.4Hz), 7.68 및 7.79(각각 2H, 각각 d,J=8.4Hz).
IR(CHCl₃): 3452, 3027, 3012, 2925, 2870, 1751, 1709, 1651, 1611, 1580, 1527, 1509, 1489 /cm.
[α]_D²⁰ = +61.3° (MeOH, c=1.00, 25°C).

No. 2a-78

[α]_D²⁰ = +67.4° (MeOH, c=1.01, 25°C).

No. 2a-79

CDCl₃, 800MHz

0.99(1H,d,J=10.2Hz), 1.15 및 1.24(각각 3H, 각각 s), 1.54-2.54(14H,m), 4.3
1(1H,m), 5.32-5.54(2H,m), 6.36(1H,d,J=8.3Hz), 6.98 및 7.48(각각 2H, 각각
d,J=8.6Hz), 7.59 및 7.75(각각 2H, 각각 d,J=8.4Hz).
IR(CHCl₃): 3598, 3448, 3192, 3030, 3010, 2925, 2870, 1708, 1644, 1608, 1591, 1559,
1530, 1518, 1491 /cm.
[α]_D²⁰ = +65.8° (MeOH, c=1.01, 25°C).

No. 2a-80

[α]_D²⁰ = +66.9° (MeOH, c=1.01, 25°C).

No. 2a-81

CDCl₃, 800MHz

0.99(1H,d,J=10.5Hz), 1.15 및 1.24(각각 3H, 각각 s), 1.54-2.48(14H,m), 3.8
6(3H,s), 4.29(1H,m), 5.34-5.52(2H,m), 6.30(1H,d,J=8.7Hz), 6.99 및 7.55 (각각
2H, 각각 d,J=9.0Hz), 7.61 및 7.77(각각 2H, 각각 d,J=8.7Hz).
IR(CHCl₃): 3460, 3009, 2925, 2870, 2838, 1740, 1708, 1650, 1608, 1557, 1538, 1512,
1491 /cm.
[α]_D²⁰ = +66.2° (MeOH, c=1.01, 25°C).

No. 2a-82

[α]_D²⁰ = +67.7° (MeOH, c=1.08, 24°C).

No. 2a-83

CDCl₃, 800MHz

0.97(1H,d,J=10.3Hz), 1.12 및 1.23(각각 3H, 각각 s), 1.54-2.48(14H,m), 3.3
3(3H,s), 4.28(1H,m), 5.32-5.52(2H,m), 6.26(1H,d,J=8.7Hz), 7.16 및 7.75 (각각
2H, 각각 d,J=8.7Hz).
IR(CHCl₃): 3462, 3030, 3022, 3012, 2925, 2870, 1754, 1709, 1654, 1604, 1585, 1522,
1495 /cm.
[α]_D²⁰ = +57.4° (MeOH, c=1.01, 24°C).

No. 2a-84

[α]_D²⁰ = +57.8° (MeOH, c=1.01, 24°C).

No. 2a-85

CDCl₃, 800MHz

0.95(1H,d,J=10.3Hz), 1.12 및 1.22(각각 3H, 각각 s), 1.54-2.48(14H,m), 4.2
5(1H,m), 5.32-5.52(2H,m), 6.28(1H,d,J=8.7Hz), 6.87 및 7.57(각각 2H, 각각
d,J=9.0Hz).
IR(CHCl₃): 3590, 3450, 3168, 3019, 3012, 2925, 2871, 1708, 1637, 1608, 1588, 1581,
1498 /cm.
[α]_D²⁰ = +56.0° (MeOH, c=1.01, 24°C).

No. 2a-86

[α]_D²⁰ = +59.8° (MeOH, c=1.01, 23°C).

No. 2a-87

CDCl_3 , 300MHz

0.98(1H, d, J=10.0Hz), 1.18 H 1.28(2H, s), 1.54-2.48(14H, m), 3.8
5(2H, s), 4.25(1H, m), 5.22-5.58(2H, m), 6.19(1H, d, J=8.6Hz), 6.98 H 7.69
(2H, s), 7.74(1H, d, J=9.0Hz).

IR(CHCl₃): 3460, 3080, 3017, 3012, 2925, 2870, 2840, 1740, 1708, 1647, 1606, 1575,
1525, 1498 cm^{-1} .

$[\alpha]_D^{25} = +55.2^\circ$ (MeOH, c=0.98, 22°C).

No. 2a-88

$[\alpha]_D^{25} = +50.9^\circ$ (MeOH, c=1.02, 25°C).

No. 2a-89

CDCl_3 , 300MHz

0.98(1H, d, J=10.2Hz), 1.18 H 1.26(2H, s), 1.56-2.48(14H, m), 4.2
9(1H, m), 5.26-5.54(2H, m), 7.03(1H, d, J=8.7Hz), 7.21(1H, s), 7.43(2H, m), 7.74(1
H, dd, J=1.8, 8.9 H 8.7Hz), 8.22(1H, dd, J=1.8 H 8.1Hz).

IR(CHCl₃): 3448, 3087, 3023, 3014, 2925, 2870, 1708, 1685, 1658, 1630, 1517, 1486
 cm^{-1} .

$[\alpha]_D^{25} = +57.1^\circ$ (MeOH, c=1.01, 22°C).

m.p. 117.0-118.0°C

No. 2a-90

$[\alpha]_D^{25} = +54.1^\circ$ (MeOH, c=1.01, 22°C).

No. 2a-91

CDCl_3 , 300MHz

0.97(1H, d, J=10.2Hz), 1.18 H 1.28(2H, s), 1.52-2.46(14H, m), 4.2
4(1H, m), 5.24-5.52(2H, m), 5.49-5.83(2H, m), 7.11(1H, dd, J=0.9 and 8.6Hz), 7.4
4(1H, dd, J=0.9 H 1.8Hz).

IR(CHCl₃): 3497, 3099, 3022, 3014, 2925, 2870, 1789, 1708, 1655, 1595, 1520, 1472 /cm.

[α]_D²⁰ = +55.0° (MeOH, c=1.00, 23°C).

No. 2a-92

[α]_D²⁰ = +50.5° (MeOH, c=1.00, 23°C).

No. 2a-93

CDCl₃, 800MHz

0.95(1H, d, J=10.5Hz), 1.12 t 1.23(각각 3H, 각각 s), 1.52-2.46(14H, m), 4.2 5(1H, m), 5.34-5.52(2H, m), 6.12(1H, d, J=8.7Hz), 7.07(1H, dd, J=3.9 t 8.1Hz), 7.45-7.48(2H, m).

IR(CHCl₃): 3450, 3023, 3011, 2925, 2870, 1789, 1708, 1645, 1531, 1501, 1471 /cm.

[α]_D²⁰ = +49.1° (MeOH, c=1.02, 24°C).

No. 2a-94

[α]_D²⁰ = +51.5° (MeOH, c=1.00, 24°C).

No. 2a-95

CDCl₃, 800MHz

0.96(1H, d, J=10.5Hz), 1.11 t 1.23(각각 3H, 각각 s), 1.52-2.46(14H, m), 4.2 5(1H, m), 5.34-5.56(2H, m), 6.14(1H, d, J=8.7Hz), 7.34(2H, d, J=2.0Hz), 7.85(1H, t, J=2.0Hz).

IR(CHCl₃): 3452, 3114, 3080, 3013 2925, 2870, 1708, 1649, 1535, 1498, 1471 /cm.

[α]_D²⁰ = +55.5° (MeOH, c=1.00, 25°C).

m.p. 87.0-88.0°C

No. 2a-96

CD₃OD 800MHz

0.94(1H,d,J=10.3Hz),1.13 δ 1.22(2H, s),1.50-1.76(3H,m),1.94-2.39(1H,m),4.11(1H,m),5.39-5.49(2H,m),7.42-7.51(2H,m),8.05(1H,m).
IR(KBr):3369,3064,2955,2921,2868,1690,1566,1538,1503 /cm.
[α]_D²⁰=+38.8° (MeOH,c=1.01,23°C).

No.2a-97

CDCl₃ 300MHz

0.92(1H,d,J=9.9Hz),1.18 δ 1.22(2H, s),1.48-1.58(3H,m),1.98-2.36(1H,m),4.10(1H,m),5.35-5.50(2H,m),7.42-7.51(2H,m),8.06(1H,m).
IR(KBr):3447,3087,2987,2922,2868,1629,1545,1501 /cm.
[α]_D²⁰=+52.9° (MeOH,c=1.01,24°C).

No.2a-98

[α]_D²⁰=+53.2° (MeOH,c=1.02,23°C).

No.2a-99

CDCl₃ 300MHz

0.97(1H,d,J=10.2Hz),1.12 δ 1.22(2H, s),1.26-2.45(2H,m),4.25(2H,m),5.24-5.52(2H,m),6.16(1H,d,J=8.7Hz),6.91 δ 7.66(2H, s),
d,J=9.0Hz).
IR(CHCl₃):3455,3029,3019,2939,2862,1738,1709,1645,1605,1528,1494 /cm.
[α]_D²⁰=+51.4° (MeOH,c=1.00,23°C).

No.2a-100

[α]_D²⁰=+49.3° (MeOH,c=1.00,24°C).

No.2a-101

[α]_D²⁰=+51.3° (MeOH,c=1.00,24°C).

No.2a-102

[α]_D²⁰=+48.8° (MeOH,c=1.01,23°C).

No.2a-103

CDCl₃ 300MHz

0.94(1H,d,J=10.3Hz),1.12 δ 1.22(2H, s),1.62-2.46(1H,m),2.48(3H,d,J=0.3Hz),4.20(1H,m),5.32-5.54(2H,m),6.46(1H,brs),7.12(1H,d,J=9.0Hz).
IR(CHCl₃):3415,3144,3029,3011,2926,2871,1706,1671,1598,1538,14564 /cm.
[α]_D²⁰=+49.6° (MeOH,c=1.01,23°C).

No.2a-104

[α]_D²⁰=+77.0° (MeOH,c=1.02,23°C).

No.2a-105

CDCl₃ 300MHz

0.98(1H,d,J=9.9Hz),1.09 δ 1.21(2H, s),1.61-2.44(1H,m),2.90(6H,s),4.20(1H,m),5.38-5.50(2H,m),5.87(1H,d,J=9.0Hz),6.28 δ 7.54(2H, s),
(2H, s),d,J=15.6Hz),6.54(1H,d,J=8.1Hz),7.08(1H,d,J=1.8Hz),7.09(1H,dd,J=1.8, δ 8.1Hz).
IR(CHCl₃):3439,3028,3012,2927,2871,2841,1739,1708,1661,1630,1600,1518 /cm.
[α]_D²⁰=+77.3° (MeOH,c=1.01,23°C).

No.2a-106

[α]_D²⁰=+67.0° (MeOH,c=1.00,23°C).

No.2a-107

$[\alpha]_D^{25} = +68.6^\circ$ (MeOH, $c = 1.01, 24^\circ$).
m.p. 188.0-170.0°C

No. 2a-108

$[\alpha]_D^{25} = +61.8^\circ$ (MeOH, $c = 1.00, 23^\circ$).

No. 2a-109

$CDCl_3$, 300MHz

0.94(1H, d, J=10.2Hz), 1.10 δ 1.22(2H, s), 1.51-2.46(14H, m), 4.2
5(1H, m), 5.88-5.49(2H, m), 6.31(1H, d, J=8.7Hz), 7.25 δ 7.60(2H, s),
d, J=8.7Hz), 7.33-7.41(5H, s).

IR(CHCl₃): 3452, 3062, 3022, 3014, 2925, 2870, 1789, 1708, 1651, 1594, 1557, 1515,
1481 cm^{-1} .

$[\alpha]_D^{25} = +61.0^\circ$ (MeOH, $c = 1.01, 22^\circ$).

No. 2a-110

CD_3OD , 300MHz

0.94(1H, d, J=9.9Hz), 1.13 δ 1.22(2H, s), 1.54-2.87(14H, m), 4.12(
1H, m), 5.38-5.49(2H, m), 7.25 δ 7.68(2H, s), d, J=8.7Hz), 7.41(5H, s)

IR(KBr): 3485, 3058, 2920, 2868, 1635, 1595, 1562, 1521, 1482, 1439, 1411 cm^{-1} .

$[\alpha]_D^{25} = +47.8^\circ$ (MeOH, $c = 1.01, 23^\circ$).

No. 2a-111

$[\alpha]_D^{25} = +65.6^\circ$ (MeOH, $c = 1.01, 24^\circ$).

No. 2a-112

$CDCl_3$, 300MHz

0.97(1H, d, J=10.2Hz), 1.12 δ 1.23(2H, s), 1.51-2.46(14H, m), 4.2
7(1H, m), 5.35-5.50(2H, m), 6.22(1H, d, J=8.4Hz), 7.40 δ 7.68(2H, s),
d, J=9.0Hz).

IR(CHCl₃): 3459, 3028, 3012, 2937, 2871, 2841, 1789, 1708, 1661, 1620, 1600, 1518
 cm^{-1} .

$[\alpha]_D^{25} = +65.6^\circ$ (MeOH, $c = 1.01, 22^\circ$).

No. 2a-113

$[\alpha]_D^{25} = +59.6^\circ$ (MeOH, $c = 1.00, 24^\circ$).

No. 2a-114

$CDCl_3$, 300MHz

0.98(1H, d, J=10.2Hz), 1.12 δ 1.24(2H, s), 1.52-2.46(14H, m), 4.2
9(1H, m), 5.35-5.51(2H, m), 6.23(1H, d, J=8.4Hz), 7.70 δ 7.83(2H, s),
d, J=8.4Hz).

IR(CHCl₃): 3439, 3028, 3012, 2937, 2871, 2841, 1789, 1708, 1661, 1620, 1600, 1518
 cm^{-1} .

$[\alpha]_D^{25} = +60.6^\circ$ (MeOH, $c = 1.01, 22^\circ$).

No. 2a-115

$[\alpha]_D^{25} = +59.7^\circ$ (MeOH, $c = 0.99, 24^\circ$).

No. 2a-116

$CDCl_3$, 300MHz

0.97(1H, d, J=10.2Hz), 1.13 δ 1.23(2H, s), 1.52-2.46(14H, m), 2.3
9(2H, s), 4.27(1H, m), 5.35-5.51(2H, m), 6.34(1H, d, J=9.0Hz), 7.23 δ 7.62
(2H, s), d, J=8.4Hz).

IR(CHCl₃): 3459, 3028, 3012, 2937, 2871, 2841, 1789, 1708, 1661, 1620, 1600, 1518
 cm^{-1} .

$[\alpha]_D^{25} = +59.7^\circ$ (MeOH, c=0.99, 24°C).

No.2a-117

$[\alpha]_D^{25} = +56.7^\circ$ (MeOH, c=1.0, 22°C).

No.2a-118

CDCl₃, 300MHz

0.96(1H, d, J=10.2Hz), 1.11 ㉑ 1.23(㉑㉑ 3H, ㉑㉑ a), 1.53-2.44(14H, m), 4.2
3(1H, m), 5.34-5.51(2H, m), 6.02(2H, s), 6.19(1H, d, J=8.7Hz), 6.89(1H, dd, J=1.2
㉑ 7.5Hz), 7.22-7.25(2H, m).

IR(CHCl₃): 3452, 3081, 3020, 3012, 2924, 2870, 1740, 1705, 1650, 1619, 1605, 1519,
1504, 1480 /cm.

$[\alpha]_D^{25} = +57.2^\circ$ (MeOH, c=1.02, 23°C).

No.2a-119

CDCl₃, 300MHz

0.96(1H, d, J=10.5Hz), 1.07 ㉑ 1.23(㉑㉑ 3H, ㉑㉑ a), 1.51-2.44(14H, m), 2.2
2(3H, s), 4.26(1H, m), 5.37-5.52(2H, m), 6.40(1H, d, J=9.0Hz), 7.09(1H, m), 7.20(1
H, m), 7.46(1H, m), 7.66(1H, m).

IR(CHCl₃): 3443, 3028, 3012, 2925, 2870, 1768, 1747, 1709, 1657, 1607, 1516, 1479
/cm.

$[\alpha]_D^{25} = +52.2^\circ$ (MeOH, c=0.99, 21°C).

No.2a-120

CDCl₃, 300MHz

0.98(1H, d, J=10.2Hz), 1.14 ㉑ 1.24(㉑㉑ 3H, ㉑㉑ a), 1.53-2.44(14H, m), 4.9
0(1H, m), 5.35-5.52(2H, m), 6.42(1H, d, J=8.7Hz), 6.86(1H, m), 6.99(1H, dd, J=1.2
㉑ 8.4Hz), 7.27(1H, m), 7.39(1H, m).

IR(CHCl₃): 3463, 3033, 3021, 3014, 2992, 2924, 2870, 1708, 1643, 1597, 1523, 1488

/cm.

$[\alpha]_D^{25} = +46.5^\circ$ (MeOH, c=1.01, 21°C).

No.2a-121

CDCl₃, 300MHz

0.98(1H, d, J=10.2Hz), 1.14 ㉑ 1.23(㉑㉑ 3H, ㉑㉑ a), 1.47-2.47(14H, m), 3.9
5(3H, s), 4.31(1H, m), 5.32-5.50(2H, m), 5.98(1H, dd, J=0.9 ㉑ 8.4Hz), 7.09(1H,
ddd, J=0.9, 7.7 ㉑ 8.4Hz), 7.45(1H, m), 8.19(1H, dd, J=2.1 ㉑ 8.1Hz), 8.32(1
H, d, J=9.0Hz).

IR(CHCl₃): 3400, 3078, 3028, 3020, 3007, 2924, 2870, 2842, 1738, 1708, 1640, 1600,
1586, 1482, 1470 /cm.

$[\alpha]_D^{25} = +35.1^\circ$ (MeOH, c=1.02, 23°C).

No.2a-122

$[\alpha]_D^{25} = +42.3^\circ$ (MeOH, c=0.99, 23°C).

No.2a-123

$[\alpha]_D^{25} = +38.7^\circ$ (MeOH, c=1.00, 21°C).

No.2a-124

$[\alpha]_D^{25} = +45.0^\circ$ (MeOH, c=1.01, 21°C).

m.p. 119.0-120.0°C

No.2a-125

$[\alpha]_D^{25} = +49.8^\circ$ (MeOH, c=1.01, 22°C).

No.2a-126

CDCl₃, 300MHz

0.97(1H, d, J=10.2Hz), 1.11 ㉑ 1.23(㉑㉑ 3H, ㉑㉑ a), 1.52-2.47(14H, m), 4.2

8(1H,m),5.34-5.50(2H,m),6.22(1H,d,J=6.7Hz),7.55-7.61(4H,m).
IR(CHCl₃):3400,3072,3028,3020,3007,2934,2870,2842,1788,1708,1640,1600,
1558,1482,1470 /cm.
[α]_D²⁰=+88.0° (MeOH,c=1.01,23°C).

5

No.2a-127

CDCl₃, 800MHz

0.91(1H,d,J=10.2Hz),1.10 ㉹ 1.20(㉹㉹ 2H,㉹㉹ a),1.50-2.42(14H,m),4.2
8(1H,m),5.31-5.51(2H,m),6.45(1H,d,J=8.4Hz),7.01(1H,t,J=7.4Hz),7.22-7.27(
10 2H,m),7.33-7.40(4H,m),7.53(2H,d,J=9.0Hz),8.30 ㉹ 8.48(㉹㉹ 1H,㉹㉹ a)

IR(CHCl₃):3452,3028,3022,3015,2925,2870,1708,1654,1590,1514,1478 /cm.
[α]_D²⁰=+59.5° (MeOH,c=1.01,23°C).

15 No.2a-128

d₆-DMSO 800MHz

0.84(1H,d,J=9.9Hz),1.06 ㉹ 1.19(㉹㉹ 2H,㉹㉹ a),1.37-2.37(14H,m),2.79(
1H,m),5.35-5.51(2H,m),6.05(1H,d,J=8.7Hz),6.85-6.90(1H,m),7.18-7.28(2H,m)
,7.35-7.38(2H,m),8.42(1H,a),12.00(1H,a).

20 IR(㉹㉹):3395,3345,2925,2866,2828,2508,1697,1658,1638,1597,1557 /cm.
[α]_D²⁰=+26.0° (MeOH,c=1.01,23°C).
m.p.164.0-166.0°C

No.2a-129

25 CDCl₃, 800MHz

1.01(1H,d,J=10.0Hz),1.17 ㉹ 1.25(㉹㉹ 2H,㉹㉹ a),1.54-2.52(14H,m),4.3
4(1H,m),5.36-5.57(2H,m),6.42(1H,d,J=8.6Hz),7.51-7.60(2H,m),7.77(1H,dd,J
=1.8 ㉹ 8.6Hz),7.85-7.96(2H,m),8.24(1H,bre).

IR(CHCl₃):3451,3060,3028,3010,2925,2870,1706,1652,1629,1600,1517,1502

/cm.

[α]_D²⁰=+68.6° (MeOH,c=1.00,23°C).

No.2a-130

CDCl₃, 800MHz

1.02(1H,d,J=10.2Hz),1.04 ㉹ 1.28(㉹㉹ 2H,㉹㉹ a),1.54-2.52(14H,m),4.4
1(1H,m),5.41-5.58(2H,m),6.14(1H,d,J=8.0Hz),7.43-7.59(4H,m),7.85-7.92(2H,
m),8.27(1H,dd,J=1.8 ㉹ 7.2Hz).

IR(CHCl₃):3488,3082,3010,2924,2870,2844,1708,1652,1512,1498 /cm.

[α]_D²⁰=+93.9° (MeOH,c=1.00,23°C)

m.p.94.0-96.0°C

No.2a-131

[α]_D²⁰=+50.2° (MeOH,c=0.95,21°C).

No.2a-132

[α]_D²⁰=+10.3° (MeOH,c=0.92,21°C).

No.2a-133

[α]_D²⁰=+50.4° (MeOH,c=1.00,21°C).

No.2a-134

[α]_D²⁰=+88.5° (MeOH,c=1.01,23°C).

No.2a-135

[α]_D²⁰=+52.5° (MeOH,c=1.01,23°C).

m.p.180.0-182.0°C

No.2a-136

m.p. 79.0-80.0°C

CDCl₃, 800MHz.

IR(CHCl₃): 8485, 3031, 3024, 2914, 2982, 2925, 2870, 1741, 1702, 1649, 1602, 1521, 1504, 1490 /cm.

$[\alpha]_D^{25} \rightarrow 82.0^\circ$ (MeOH, $c=1.01, 25^\circ\text{C}$).

CDCl₃, 800MHz.

0.97(1H,d,J=10.2Hz),1.11-1.22(2x2H,2x2H),1.85(6H,d,J=6.0Hz),1.53-2.46(14H,m),4.25(1H,m),4.51(1H,m),5.33-5.50(2H,m),6.12(1H,d,J=9.0Hz),6.87-6.99(2H,m),7.65-7.68(2H,m).

IR(CHCl₃): 8454, 8031, 8014, 2950, 2925, 2870, 1741, 1703, 1549, 1602, 1522, 1490
/cm.

 $[\alpha]_D^{25} = +50.0^\circ$ (MeOH, $c = 1.05, 25^\circ\text{C}$).

CDCl₃, 800MHz

1.00(1H, d, J=10.2Hz), 1.16 (s, 3H, CH₃), 1.59-2.53(14H, m), 4.51(1H, m), 5.40-5.53(2H, m), 6.86(1H, d, J=6.7Hz), 6.70(1H, d, J=1.5Hz), 7.12(1H, m), 7.80(1H, m), 7.47(1H, dd, J=0.6 Hz, 8.1Hz), 7.61(1H, d, J=8.4Hz).

IR(CHCl₃): 3449, 3243, 3029, 3022, 3013, 2925, 2871, 1707, 1631, 1542, 1503 /cm.

$[\alpha]_D^{25} = +63.4^\circ$ (MeOH, $c = 1.00, 25^\circ\text{C}$).

m.p. 178.0-179.0°C

CDCl₃, 300MHz.

0.97(1H,d,J=10.2Hz), 1.18 s 1.23(zzz) 3H,zzz s), 1.57-2.50(14H,m), 4.8
5(1H,m), 5.82-5.85(2H,m), 6.42(1H,d,J=8.7Hz), 6.70(1H,d,J=1.5Hz), 7.21-7.34(
2H m), 7.46(1H,m), 7.76(1H,m), 7.86(1H,d,J=3.0Hz), 10.20(1H,s).

IR(CHCl₃): 3465, 3010, 2924, 1739, 1604, 1546, 1504 /cm.

$[\alpha]_D^{25} = +39.4^\circ$ (MeOH, $c = 1.01, 22^\circ\text{C}$).

m.p. 167.0-168.0°C

CDCl₃, 800MHz

0.99(1H, d, J=10.2Hz), 1.14 (s) 1.24(2H, s, 3H, 2H, s), 1.55-2.44(14H, m), 3.8
4(3H, s), 4.27(1H, m), 5.84-5.52(2H, m), 6.38(1H, d, J=9.0Hz), 6.91 (s) 7.47
(2H, s, 2H, s, d, J=9.0Hz), 6.98 (s) 7.14(2H, s, 2H, s, d, J=16.5Hz), 7.54
(s) 7.70(2H, s, 2H, s, d, J=8.7Hz).

IR(CHCl₃): 3453, 3025, 3015, 2925, 2870, 2859, 1740, 1708, 1649, 1602, 1510, 1492, 1470 /cm.

$[\alpha]_D^{25} = +78.4^\circ$ (MeOH, $c = 1.02, 22^\circ\text{C}$).

M.P. 155.0-157.0°C

CDCL 300MHz

0.97(1H, d, J=10.2Hz), 1.11 및 1.23(각각 3H, 각각 s), 1.52-2.45(14H, m), 3.7
9(3H, s), 4.37(1H, m), 5.84-5.50(2H, m), 6.34(1H, d, J=9.0Hz), 6.49 및 6.62
(각각 1H 각각 d, J=12.8Hz), 6.77 및 7.16(각각 2H, 각각 d, J=6.7Hz), 7.82
및 7.59(각각 2H, 각각 d, J=8.1Hz).

IR(CHCl₃): 3453, 3025, 3014, 2925, 2870, 2839, 1739, 1703, 1649, 1606, 1510, 1494 /cm.

$[\alpha]_D^{25} = +50.7^\circ$ (MeOH, c=0.99, 25°C).

No. 2a-143

$[\alpha]_D^{25} = +57.5^\circ$ (MeOH, c=1.01, 25°C).

No. 2a-144

$[\alpha]_D^{25} = +12.2^\circ$ (MeOH, c=1.00, 25°C).

m.p. 114.0-116.0°C

No. 2a-145

CDCl₃, 300MHz

0.95(1H, d, J=10.3Hz), 1.10 (1.21(2H, s), 1.53-2.44(14H, m), 4.2
5(1H, m), 5.33-5.49(2H, m), 6.37(1H, d, J=8.7Hz), 7.45-7.47(3H, m), 7.62-7.64(2H,
m), 7.69 (7.80(2H, s), 7.80(2H, s), 7.80(2H, s).

IR(CHCl₃): 3449, 3058, 3027, 3012, 2925, 2870, 1708, 1655, 1513, 1481, 1048 /cm.

$[\alpha]_D^{25} = +61.0^\circ$ (MeOH, c=1.01, 25°C).

No. 2a-146

CDCl₃, 300MHz

0.95(1H, d, J=10.5Hz), 1.09 (1.21(2H, s), 1.50-2.41(14H, m), 4.2
5(1H, m), 5.33-5.49(2H, m), 6.33(1H, d, J=8.4Hz), 7.49-7.51(3H, m), 7.91-7.92(2H,
m), 7.92 (7.97(2H, s), 7.97(2H, s), 7.97(2H, s).

IR(CHCl₃): 3447, 3029, 3023, 3015, 2925, 2870, 1708, 1660, 1514, 1484, 1321, 1161 /cm.

$[\alpha]_D^{25} = +62.0^\circ$ (MeOH, c=1.00, 25°C).

No. 2a-147

CDCl₃, 300MHz

0.97(1H, d, J=10.3Hz), 1.12 (1.23(2H, s), 1.53-2.46(14H, m), 2.5

1(3H, s), 4.28(1H, m), 5.84-5.81(2H, m), 6.33(1H, d, J=8.4Hz), 7.26 (7.64

(2H, s), 7.64(2H, s), 7.64(2H, s).

IR(CHCl₃): 3458, 3027, 3015, 2925, 2870, 2885, 1708, 1645, 1596, 1516, 1484 /cm.

$[\alpha]_D^{25} = +67.7^\circ$ (MeOH, c=0.82, 25°C).

No. 2a-148

$[\alpha]_D^{25} = +72.5^\circ$ (MeOH, c=1.01, 25°C).

No. 2a-149

$[\alpha]_D^{25} = +67.8^\circ$ (MeOH, c=0.98, 25°C).

No. 2a-150

CDCl₃, 300MHz

0.94(1H, d, J=10.3Hz), 1.10 (1.23(2H, s), 1.53-2.50(14H, m), 4.2
2(1H, m), 5.36-5.55(2H, m), 6.48(1H, d, J=8.4Hz), 8.25(1H, s), 8.90(1H, s).

IR(CHCl₃): 3448, 3374, 3091, 3024, 3012, 2925, 2871, 1709, 1652, 1525, 1494 /cm.

$[\alpha]_D^{25} = +58.1^\circ$ (MeOH, c=1.01, 25°C).

m.p. 120.0-122.0°C

No. 2a-151

$[\alpha]_D^{25} = +40.6^\circ$ (MeOH, c=1.01, 25°C).

No. 2a-152

CDCl₃, 300MHz

0.96(1H, d, J=10.5Hz), 1.10 (1.24(2H, s), 1.50-2.50(14H, m), 2.7
1(3H, s), 4.26(1H, m), 5.37-5.51(2H, m), 6.02(1H, d, J=9.0Hz), 8.78(1H, s).

IR(CHCl₃): 3468, 3495, 3087, 3025, 3014, 2925, 2870, 1708, 1649, 1525, 1503 /cm.

$[\alpha]_D^{25} = +54.1^\circ$ (MeOH, c=1.02, 25°C).

- No.2a-153
CDCl₃, 300MHz
0.95(1H,d,J=9.9Hz),1.11 ㉞ 1.22(㉞㉞ 3H,㉞㉞ a),1.50-2.50(14H,m),2.50(3H,s),4.28(1H,m),5.28-5.51(2H,m),6.01(1H,d,J=8.4Hz),6.89(1H,d,J=3.1Hz),7.26(1H,d,J=5.1Hz).
IR(CHCl₃):3469,3431,3025,3012,2925,2871,2664,1708,1659,1544,1505 /cm.
[α]_D²⁰=+35.8° (MeOH,c=1.02,22°C).
- No.2a-154
CDCl₃, 300MHz
0.95(1H,d,J=9.9Hz),1.10 ㉞ 1.22(㉞㉞ 3H,㉞㉞ a),1.52-2.48(14H,m),2.51(3H,d,J=1.2Hz),4.28(1H,m),5.24-5.50(2H,m),6.00(1H,d,J=8.4Hz),6.72(1H,dd,J=5.1 ㉞ 3.6Hz),7.29(1H,d,J=3.6Hz).
IR(CHCl₃):3450,3431,3026,3011,2925,2869,1739,1708,1659,1547,1506 /cm.
[α]_D²⁰=+50.5° (MeOH,c=1.01,22°C).
- No.2a-155
CDCl₃, 300MHz
0.99(1H,d,J=10.2Hz),1.19 ㉞ 1.25(㉞㉞ 3H,㉞㉞ a),1.55-2.48(14H,m),4.31(1H,m),5.26-5.51(2H,m),6.79(1H,d,J=9.8Hz),7.29(1H,m),7.41(1H,m),7.48(1H,s),7.51(1H,m),7.64(1H,d,J=8.1Hz).
IR(CHCl₃):3436,3029,3024,3015,2925,2871,2670,1708,1659,1598,1510 /cm.
[α]_D²⁰=+69.1° (MeOH,c=1.01,22°C).
- No.2a-156
CDCl₃:CD₂O_D=10:1 300MHz
0.99(1H,d,J=9.9Hz),1.11 ㉞ 1.21(㉞㉞ 3H,㉞㉞ a),1.56-2.58(14H,m),4.22(1H,m),5.25-5.69(2H,m),6.88(1H,d,J=8.4Hz),7.48(1H,d,J=8.4Hz),7.61(1H,dd,J=1.5 ㉞ 8.4Hz),8.09(1H,d,J=1.8Hz),8.12(1H,s).
IR(KBr):3422,3115,2985,2922,2862,2609,1708,1636,1578,1529,1470 /cm.
[α]_D²⁰=+62.8° (MeOH,c=1.01,22°C).
- No.2a-157
5 [α]_D²⁰=+40.0° (MeOH,c=0.95,22°C).
- No.2a-158
CDCl₃, 300MHz
1.00(1H,d,J=10.5Hz),1.17 ㉞ 1.24(㉞㉞ 3H,㉞㉞ a),1.54-2.50(14H,m),4.34(1H,m),5.26-5.52(2H,m),7.80(1H,d,J=9.0Hz),9.30(1H,s).
IR(CHCl₃):3410,3122,3080,3012,2925,2871,2668,1709,1667,1528,1466 /cm.
[α]_D²⁰=+44.9° (MeOH,c=0.99,22°C).
- No.2a-159
15 CDCl₃, 300MHz
0.97(1H,d,J=10.2Hz),1.13 ㉞ 1.22(㉞㉞ 3H,㉞㉞ a),1.55-2.49(14H,m),3.03(6H,s),4.23(1H,m),5.22-5.51(2H,m),6.16(1H,d,J=8.7Hz),6.57 ㉞ 7.63(㉞㉞ 2H,㉞㉞ d,J=9.7Hz).
IR(CHCl₃):3467,3028,3008,2924,2870,2654,1739,1709,1637,1608,1606,1584,1501 /cm.
[α]_D²⁰=+84.8° (MeOH,c=1.01,22°C).
- No.2a-160
25 d₆-DMSO 300MHz
0.83(1H,d,J=9.9Hz),1.02 ㉞ 1.19(㉞㉞ 3H,㉞㉞ a),1.58-1.61(8H,m),1.90-2.32(11H,m),3.90(1H,m),5.41-5.44(2H,m),7.22(1H,dd,J=0.9 ㉞ 7.2Hz),7.45-7.60(2H,m),7.77(1H,dd,J=0.9 ㉞ 7.2Hz),8.03(1H,d,J=6.9Hz),12.40(1H,s).
IR(㉞㉞):3315,2924,2858,2656,2525,1727,1703,1627,1595,1531,1541 /cm.
[α]_D²⁰=+78.5° (MeOH,c=1.01,24°C).

m.p.161.0-162.0°C

No.2a-161

$[\alpha]_D^{25} = +65.8^\circ$ (MeOH, c=1.00, 22°C).

No.2a-162

CDCl₃, 800MHz

0.99(1H, d, J=10.3Hz), 1.12 W 1.25(각각 3H, 각각 a), 1.53-2.45(14H, m), 4.3
0(1H, m), 5.36-5.51(2H, m), 6.32(1H, d, J=8.4Hz), 7.88 W 8.28(각각 2H, 각각
d, J=9.0Hz).

IR(CHCl₃): 3448, 3029, 3016, 2925, 2870, 1708, 1664, 1602, 1527, 1484, 1347 /cm.

$[\alpha]_D^{25} = +72.7^\circ$ (MeOH, c=1.02, 22°C).

No.2a-168

CDCl₃, 800MHz

0.96(1H, d, J=10.2Hz), 1.11 W 1.33(각각 3H, 각각 a), 1.55-2.61(14H, m), 4.3
6(1H, m), 5.35-5.57(2H, m), 6.68(1H, d, J=7.8Hz), 7.41(1H, dd, J=4.8 W 8.1Hz),
8.20(1H, d, J=8.1Hz), 8.65(1H, d, J=4.8Hz), 9.00(1H, s).

IR(CHCl₃): 3448, 3026, 3018, 2925, 2870, 2584, 1709, 1658, 1590, 1515, 1471 /cm.

$[\alpha]_D^{25} = +71.8^\circ$ (MeOH, c=1.01, 22°C).

No.2a-164

$[\alpha]_D^{25} = +40.8^\circ$ (MeOH, c=0.98, 22°C).

No.2a-165

CDCl₃, 800MHz

0.98(1H, d, J=10.5Hz), 1.11 W 1.24(각각 3H, 각각 a), 1.55-2.52(14H, m), 4.2
4(1H, m), 5.37-5.57(2H, m), 6.65(1H, d, J=7.8Hz), 7.59 W 8.53(각각 2H
각각 d, J=6.0Hz).

IR(CHCl₃): 3447, 3346, 3028, 3016, 2925, 2870, 2538, 1941, 1708, 1662, 1556, 1516
/cm.

$[\alpha]_D^{25} = +75.4^\circ$ (MeOH, c=1.01, 22°C).

No.2a-166

CDCl₃, 800MHz

0.97(1H, d, J=10.2Hz), 1.11 W 1.22(각각 3H, 각각 a), 1.51-2.44(14H, m), 2.9
6(6H, s), 4.25(1H, m), 5.33-5.50(2H, m), 6.19(1H, d, J=8.7Hz), 6.77 W 6.97
(각각 2H, 각각 d, J=8.4Hz), 8.94 W 7.65(각각 2H, 각각 d, J=9.0Hz).

IR(CHCl₃): 3453, 3024, 3016, 2924, 2871, 2806, 1789, 1708, 1647, 1612, 1604, 1516,
1490 /cm.

$[\alpha]_D^{25} = +53.1^\circ$ (MeOH, c=1.02, 22°C).

m.p.104.0-105.5°C

No.2a-167

CDCl₃, 800MHz

1.01(1H, d, J=9.9Hz), 1.19 W 1.26(각각 3H, 각각 a), 1.56-2.53(14H, m), 4.37(
1H, m), 5.35-5.55(2H, m), 6.47(1H, d, J=8.4Hz), 7.61-7.71(2H, m), 7.79(2H, s), 7.89
-7.97(2H, m), 8.27(1H, d, J=2.1Hz), 8.66-8.78(2H, m).

IR(CHCl₃): 3460, 3024, 3014, 2925, 2870, 2667, 1707, 1650, 1631, 1609 /cm.

$[\alpha]_D^{25} = +70.5^\circ$ (MeOH, c=1.00, 22°C).

No.2a-168

CDCl₃, 800MHz

1.02(1H, d, J=10.2Hz), 1.30 W 1.26(각각 3H, 각각 a), 1.56-2.60(14H, m), 4.3
8(1H, m), 5.36-5.56(2H, m), 6.51(1H, d, J=8.4Hz), 7.61-7.93(7H, m), 8.74(1H, d, J=
8.4Hz), 9.15(1H, s).

IR(CHCl₃): 3517, 3451, 3060, 3028, 3011, 2925, 2870, 2664, 1709, 1651, 1619, 1498/
cm.

$[\alpha]_D^{25} = +54.4^\circ$ (MeOH, $c=1.00, 25^\circ\text{C}$).

No. 2a-169

CDCl_3 , 300MHz

0.96(1H, d, $J=10.5\text{Hz}$), 1.09 (s) 1.21(2H, s, s), 1.50-2.44(14H, m), 2.8
5(3H, s), 4.24(1H, m), 5.22-5.45(2H, m), 6.19(1H, d, $J=8.4\text{Hz}$), 6.94 (s) 7.45 (s)
(2H, s, s) d, $J=9.0\text{Hz}$), 7.11 (s) 7.45(2H, s, s) d, $J=8.7\text{Hz}$).

IR(CHCl₃): 3516, 3453, 3029, 3009, 2925, 2870, 2840, 2665, 1706, 1650, 1593, 1515,
1493, 1482 /cm.

$[\alpha]_D^{25} = +57.8^\circ$ (MeOH, $c=1.00, 25^\circ\text{C}$).

No. 2a-170

CDCl_3 , 300MHz

0.98(1H, d, $J=10.2\text{Hz}$), 1.15 (s) 1.24(2H, s, s), 1.52-2.50(14H, m), 4.2
8(1H, m), 5.38-5.54(2H, m), 6.25(1H, d, $J=8.2\text{Hz}$), 7.38-7.44(2H, m), 7.74(1H, s), 7.
81-7.86(2H, m).

IR(CHCl₃): 3517, 3448, 3427, 3024, 3013, 2925, 2870, 2669, 1708, 1650, 1582, 1525,
1500 /cm.

$[\alpha]_D^{25} = +51.6^\circ$ (MeOH, $c=1.00, 25^\circ\text{C}$).

No. 2a-171

CDCl_3 , 300MHz

0.96(1H, d, $J=10.2\text{Hz}$), 1.11 (s) 1.22(2H, s, s), 1.52-2.42(14H, m), 2.48
(3H, s), 4.21(1H, m), 5.31-5.52(2H, m), 6.06(1H, d, $J=8.2\text{Hz}$), 6.97 (s) 7.59 (s)
(2H, s, s) d, $J=1.2\text{Hz}$).

IR(CHCl₃): 3452, 3113, 3028, 3007, 2925, 2870, 2669, 1708, 1645, 1554, 1509 /cm.

$[\alpha]_D^{25} = +52.4^\circ$ (MeOH, $c=1.00, 25^\circ\text{C}$).

No. 2a-172

CDCl_3 , 300MHz

0.96(1H, d, $J=10.2\text{Hz}$), 1.09 (s) 1.22(2H, s, s), 1.50-2.40(14H, m), 2.6
9(3H, s), 4.24(1H, m), 5.35-5.51(2H, m), 5.96(1H, d, $J=8.7\text{Hz}$), 7.03 (s) 7.07 (s)
(2H, s, s) d, $J=5.4\text{Hz}$).

IR(CHCl₃): 3451, 3031, 3013, 2925, 2870, 2666, 1706, 1647, 1642, 1497 /cm.

$[\alpha]_D^{25} = +51.2^\circ$ (MeOH, $c=1.00, 25^\circ\text{C}$).

No. 2a-173

CDCl_3 , 300MHz

0.95(1H, d, $J=10.2\text{Hz}$), 1.10 (s) 1.23(2H, s, s), 1.50-2.45(14H, m), 4.3
2(1H, m), 5.35-5.49(2H, m), 6.05(1H, d, $J=8.4\text{Hz}$), 7.28 (s) 7.75(2H, s, s)
d, $J=1.5\text{Hz}$).

IR(CHCl₃): 3451, 3011, 3029, 3011, 2925, 2870, 1708, 1652, 1528, 1500 /cm.

$[\alpha]_D^{25} = +50.6^\circ$ (MeOH, $c=1.01, 25^\circ\text{C}$).

No. 2a-174

CDCl_3 , 300MHz

0.96(1H, d, $J=10.2\text{Hz}$), 1.12 (s) 1.23(2H, s, s), 1.52-2.50(14H, m), 4.2
9(1H, m), 5.35-5.51(2H, m), 7.02(1H, d, $J=8.4\text{Hz}$), 7.82 (s) 8.16(2H, s, s)
d, $J=3.8\text{Hz}$).

IR(CHCl₃): 3417, 3115, 3028, 3014, 2925, 2870, 1708, 1645, 1530 /cm.

$[\alpha]_D^{25} = +48.8^\circ$ (MeOH, $c=1.02, 25^\circ\text{C}$).

No. 2a-175

CDCl_3 , 300MHz

0.97(1H, d, $J=10.2\text{Hz}$), 1.14 (s) 1.23(2H, s, s), 1.50-2.52(14H, m), 2.5
2(3H, s), 4.29(1H, m), 5.24-5.51(2H, m), 7.78(1H, d, $J=9.0\text{Hz}$), 7.24 (s) 7.52 (s)
(2H, s, s) d, $J=5.4\text{Hz}$).

IR(CHCl₃): 3229, 3093, 3023, 3015, 2924, 2871, 1706, 1640, 1528 /cm.

$[\alpha]_D^{25} = +45.0^\circ$ (MeOH, $c = 1.01, 25^\circ\text{C}$).

No. 2a-176

CDCl_3 , 300MHz

0.96(1H, d, $J = 10.5\text{Hz}$), 1.09 W 1.23(각각 3H, 각각 a), 1.52-2.48(14H, m), 2.4
0(3H, d, $J = 0.9\text{Hz}$), 4.24(1H, m), 5.35-5.51(2H, m), 6.05(1H, d, $J = 8.7\text{Hz}$), 6.95(1H,
m), 7.57(1H, d, $J = 8.3\text{Hz}$).

IR(CHCl₃): 3517, 3444, 3103, 3034, 3013, 2926, 2870, 1789, 1708, 1649, 1636, 1507/
cm.

$[\alpha]_D^{25} = +54.5^\circ$ (MeOH, $c = 1.01, 25^\circ\text{C}$).

m.p. 97.0-99.0°C

No. 2a-177

CDCl_3 , 300MHz

0.97(1H, d, $J = 10.3\text{Hz}$), 1.11 W 1.23(각각 3H, 각각 a), 1.52-2.45(14H, m), 3.9
3(3H, s), 4.37(1H, m), 5.34-5.50(2H, m), 6.35(1H, d, $J = 8.3\text{Hz}$), 7.50(1H, d, $J = 8.7\text{Hz}$),
8.10(1H, d, $J = 8.3\text{Hz}$).

IR(CHCl₃): 3395, 3121, 3031, 3019, 3013, 2925, 2871, 1722, 1709, 1640, 1557, 1533
/cm.

$[\alpha]_D^{25} = +22.5^\circ$ (MeOH, $c = 1.01, 25^\circ\text{C}$).

m.p. 109.0-112.0°C

No. 2a-178

CDCl_3 , 300MHz

0.96(1H, d, $J = 10.5\text{Hz}$), 1.10 W 1.23(각각 3H, 각각 a), 1.51-2.45(14H, m), 4.2
4(1H, m), 5.55-5.50(2H, m), 6.09(1H, d, $J = 8.4\text{Hz}$), 7.17-7.31(5H, m), 7.95(1H, d, $J =$
1.5Hz).

IR(CHCl₃): 3510, 3451, 3062, 3031, 3022, 3011, 2925, 2870, 2682, 1708, 1651, 1582,
1555, 1497, 1477/cm.

$[\alpha]_D^{25} = +47.9^\circ$ (MeOH, $c = 1.01, 25^\circ\text{C}$).

No. 2a-179

CDCl_3 , 300MHz

0.96(1H, d, $J = 10.3\text{Hz}$), 1.14 W 1.24(각각 3H, 각각 a), 1.52-2.48(14H, m), 4.3
0(1H, m), 5.36-5.52(2H, m), 6.73(1H, d, $J = 9.0\text{Hz}$), 6.26 W 7.37(각각 1H, 각각
d, $J = 6.0\text{Hz}$).

IR(CHCl₃): 3509, 3429, 3115, 3094, 3025, 3014, 2925, 2871, 2666, 1708, 1649, 1529,
1510 /cm.

$[\alpha]_D^{25} = +51.0^\circ$ (MeOH, $c = 1.02, 25^\circ\text{C}$).

No. 2a-180

CDCl_3 , 300MHz

0.95(1H, d, $J = 10.3\text{Hz}$), 1.14 W 1.24(각각 3H, 각각 a), 1.52-2.48(14H, m), 3.8
9(3H, s), 4.21(1H, m), 5.35-5.50(2H, m), 6.05(1H, d, $J = 8.4\text{Hz}$), 6.46 W 7.04 (각각 1H, 각각
d, $J = 1.8\text{Hz}$).

IR(CHCl₃): 3516, 3450, 3114, 3031, 3010, 2925, 2871, 1708, 1646, 1546, 1511, 1477
/cm.

$[\alpha]_D^{25} = +49.1^\circ$ (MeOH, $c = 1.01, 25^\circ\text{C}$).

No. 2a-181

CDCl_3 , 300MHz

0.97(1H, d, $J = 10.3\text{Hz}$), 1.14 W 1.23(각각 3H, 각각 a), 1.52-2.48(14H, m), 2.4
2(3H, s), 4.31(1H, m), 5.34-5.52(2H, m), 6.07(1H, d, $J = 8.3\text{Hz}$), 7.37 W 8.17 (각각 1H, 각각
d, $J = 3.3\text{Hz}$).

IR(CHCl₃): 3510, 3301, 3112, 3023, 3007, 2924, 2871, 2682, 1708, 1635, 1584 /cm.

$[\alpha]_D^{25} = +41.0^\circ$ (MeOH, $c = 0.96, 25^\circ\text{C}$).

No. 2a-182

H_m), 10.81(1H, brs).
IR(CHCl₃): 3450, 3236, 3112, 3029, 3015, 2925, 2871, 2645, 1701, 1616, 1558, 1516
/cm.
[α]_D²⁰ = +50.6° (MeOH, c = 1.01, 24°C).

No. 2a-189

CDCl₃, 300MHz
0.94(1H, d, J = 9.8Hz), 1.11 W 1.22(각각 3H, 각각 a), 1.50-2.46(14H, m), 3.93(3H, s), 4.18(1H, m), 5.35-5.52(2H, m), 6.09(1H, d, J = 9.8Hz), 6.09(1H, m), 6.48(1H, m), 6.78(1H, m).
IR(CHCl₃): 3452, 3102, 3028, 3007, 2925, 2871, 2666, 1739, 1708, 1650, 1536, 1499, 1471 /cm.
[α]_D²⁰ = +49.8° (MeOH, c = 1.01, 23°C).
m.p. 101.5-103.5°C

No. 2a-190

CDCl₃, 300MHz
0.94(1H, d, J = 9.8Hz), 1.11 W 1.21(각각 3H, 각각 a), 1.54-2.47(14H, m), 4.23(1H, m), 5.38-5.52(2H, m), 6.06(1H, d, J = 9.0Hz), 6.84(1H, m), 6.75(1H, m), 6.36(1H, m), 6.71(1H, brs).
IR(CHCl₃): 3470, 3215, 3030, 3020, 3010, 2925, 2871, 2664, 1709, 1612, 1664, 1510 /cm.
[α]_D²⁰ = +43.8° (MeOH, c = 1.01, 24°C).

No. 2a-191

CDCl₃, 300MHz
0.96(1H, d, J = 10.2Hz), 1.11 W 1.22(각각 3H, 각각 a), 1.55-2.44(14H, m), 3.63(3H, s), 4.30(1H, m), 5.35-5.51(2H, m), 5.93(1H, d, J = 8.4Hz), 6.27(1H, dd, J = 1.3 W 2.7Hz), 6.56(1H, t, J = 2.7Hz), 7.19(1H, t, J = 1.5Hz).
IR(CHCl₃): 3452, 3031, 3018, 3006, 2925, 2871, 2662, 1736, 1710, 1634, 1609, 1556, 1498 /cm.
[α]_D²⁰ = +43.1° (MeOH, c = 1.01, 23°C).

No. 2a-192

CDCl₃, 300MHz
0.96(1H, d, J = 10.5Hz), 1.11 W 1.21(각각 3H, 각각 a), 1.48(3H, t, J = 7.5Hz), 1.54-2.44(14H, m), 3.93(2H, q, J = 7.5Hz), 4.21(1H, m), 5.35-5.51(2H, m), 5.94(1H, d, J = 8.4Hz), 6.27(1H, dd, J = 1.3 W 2.7Hz), 6.63(1H, t, J = 2.7Hz), 7.26(1H, t, J = 1.5Hz).
IR(CHCl₃): 3630, 3452, 3032, 3018, 3006, 2925, 2871, 2661, 1735, 1710, 1633, 1610, 1555, 1497 /cm.
[α]_D²⁰ = +40.1° (MeOH, c = 1.00, 23°C).

No. 2a-193

CDCl₃, 300MHz
0.95(1H, d, J = 10.2Hz), 1.10 W 1.22(각각 3H, 각각 a), 1.53-2.49(14H, m), 2.53(3H, s), 4.21(1H, m), 5.35-5.54(2H, m), 6.15(1H, d, J = 8.1Hz), 6.52(1H, dd, J = 1.3 W 3.6Hz), 7.29(1H, t, J = 3.6Hz), 7.94(1H, t, J = 1.5Hz).
IR(CHCl₃): 3516, 3450, 3410, 3152, 3027, 3015, 2925, 2871, 2670, 1732, 1648, 1574, 1509 /cm.
[α]_D²⁰ = +45.0° (MeOH, c = 1.01, 25°C).

No. 2a-194

CDCl₃, 300MHz
0.99(1H, d, J = 10.2Hz), 1.11 W 1.24(각각 3H, 각각 a), 1.52-2.53(14H, m), 4.34(1H, m), 5.23-5.57(2H, m), 6.21(1H, d, J = 8.5Hz), 7.35-7.50(2H, m), 7.23(1H, s), 7.66(1H, m), 8.31(1H, m).
IR(CHCl₃): 3443, 3067, 3018, 2925, 2870, 2665, 1703, 1651, 1515, 1493 /cm.

$[\alpha]_D^{25} = +55.7^\circ$ (MeOH, c=1.01, 23°C).

No. 2a-195

CDCl₃, 300MHz

1.01(1H, d, J=10.0Hz), 1.06 ㉞ 1.23(각각 3H, 각각 a), 1.50-2.64(14H, m), 2.6
8(3H, s), 4.40(1H, m), 5.36-5.81 H, m), 6.02(1H, d, J=9.4Hz), 7.80-7.42(3H, m), 7.
73-7.86(2H, m).

IR(CHCl₃): 3510, 3434, 3062, 3022, 3014, 2924, 2871, 2869, 1708, 1650, 1633, 1539,
1500 /cm.

$[\alpha]_D^{25} = +72.4^\circ$ (MeOH, c=1.00, 23°C).

m.p. 111.0-112.0°C

No. 2a-196

CDCl₃, 300MHz

0.42 ㉞ 1.04(각각 3H, 각각 a), 0.80(1H, d, J=10.0Hz), 1.11-2.48(14H, m), 2.2
4(3H, s), 4.02(1H, m), 5.23-5.44(2H, m), 5.58(1H, d, J=8.8Hz), 7.27-7.21(2H, m), 7.
42-7.48(3H, m), 7.93(1H, s).

IR(CHCl₃): 3419, 3114, 3025, 3006, 2924, 2871, 2862, 1737, 1709, 1635, 1540, 1519
/cm.

$[\alpha]_D^{25} = +48.7^\circ$ (MeOH, c=1.01, 23°C).

No. 2a-197

CDCl₃, 300MHz

0.95(1H, d, J=10.0Hz), 1.09 ㉞ 1.23(각각 3H, 각각 a), 1.54-2.46(15H, m), 2.7
7(4H, brs), 4.21(1H, m), 5.32-5.54(2H, m), 6.02(1H, d, J=8.6Hz), 7.43(1H, s).

IR(CHCl₃): 3445, 3101, 3024, 3014, 2928, 2865, 2861, 1739, 1708 1648, 1550, 1507
/cm.

$[\alpha]_D^{25} = +51.9^\circ$ (MeOH, c=1.01, 23°C).

No. 2a-198

CDCl₃, 300MHz

0.95(1H, d, J=10.2Hz), 1.11 ㉞ 1.22(각각 3H, 각각 a), 1.50-2.44(14H, m), 4.3
4(1H, m), 4.42(2H, s), 5.85-5.49(3H, m), 6.25(1H, d, J=8.1Hz), 7.33(1H, m), 7.43(1
H, dd, J=1.5 ㉞ 7.5Hz), 7.49(1H, d, J=8.1Hz), 7.80-7.68(1H, m), 7.68(1H, dd, J=1.
8 ㉞ 7.8Hz), 8.02(1H, d, J=1.8Hz), 8.19(1H, dd, J=1.5 ㉞ 8.1Hz).

IR(CHCl₃): 3448, 3030, 3012, 2925, 2870, 1739, 1708, 1671, 1558, 1559, 1514, 1472
/cm.

$[\alpha]_D^{25} = +56.9^\circ$ (MeOH, c=1.01, 24°C).

No. 2a-199

CDCl₃, 300MHz

0.96(1H, d, J=10.2Hz), 1.11 ㉞ 1.22(각각 3H, 각각 a), 1.51-2.46(14H, m), 2.4
0(1H, m), 2.76(1H, m), 4.24(1H, m), 5.33-5.51(3H, m), 6.25(1H, m), 7.16(1H, m), 7.2
4-7.33(2H, m), 7.46(1H, d, J=7.5Hz), 7.52-7.60(2H, m), 7.66(1H, dd, J=1.8 and 4.
5Hz).

IR(CHCl₃): 3553, 3447, 3063, 3025, 3018, 2924, 2871, 2862, 1708, 1651, 1600, 1557,
1514, 1471 /cm.

$[\alpha]_D^{25} = +54.5^\circ$ (MeOH, c=1.00, 23°C).

No. 2a-200

CDCl₃, 300MHz

0.96(1H, d, J=10.2Hz), 1.12 ㉞ 1.23(각각 3H, 각각 a), 1.51-2.46(14H, m), 4.3
5(1H, m), 5.34-5.51(2H, m), 6.25(1H, d, J=8.4Hz), 7.02 ㉞ 7.10(각각 1H, 각각
d, J=12.8Hz), 7.23-7.33(4H, m), 7.50(1H, m), 7.64(1H, dd, J=1.8 and 7.8Hz), 7.8
2(1H, d, J=1.8Hz).

IR(CHCl₃): 3450, 3060, 3025, 3014, 2925, 2871, 2862, 1708, 1653, 1606, 1542, 1519,
1478 /cm.

$[\alpha]_D^{25} = +92.5^\circ$ (MeOH, c=1.00, 24°C).

No.2a-201

CDCl₃, 300MHz

0.95(1H,d,J=9.9Hz),1.15 ㉹ 1.22(각각 3H, 각각 a),1.55-2.60(14H,m),4.28(1H,m),5.85-5.88(2H,m),7.14(1H,d,J=9.9Hz),7.34 ㉹ 7.40(각각,1H, 각각 d, J=12.9Hz),7.82-7.75(4H,m),8.25-8.80(2H,m),8.72(1H,d,J=1.5Hz).

IR(CHCl₃):3448,3389,3297,3061,3030,3016,2925 2870,1726,1708 1652,160 8,1521,1483,1472,1309 /cm.

[α]_D=+61.1° (MeOH,c=1.01,28°C).

No.2a-202

CDCl₃, 300MHz

0.96(1H,d,J=10.2Hz),1.09 ㉹ 1.22(각각 3H, 각각 a),1.52-2.43(14H,m),2.6 3(3H,a),4.25(1H,m),5.32-5.49(2H,m),6.19(1H,d,J=8.4Hz),7.10 ㉹ 7.58 (각각 2H, 각각 d,J=9.0Hz),7.21(1H,m),7.30-7.32(2H,m),7.46(1H,d,J=7.5Hz)

IR(CHCl₃):3511,3459,3062,3022,3014,2925 2870,1739,1708,1650,1595,1556, 1516,1482,1471 /cm.

[α]_D=+60.2° (MeOH,c=1.01,25°C).

No.2a-203

CDCl₃, 300MHz

0.98(1H,d,J=10.5Hz),1.09 ㉹ 1.23(각각 3H, 각각 a),1.52-2.43(14H,m),4.2 8(1H,m),5.85-5.81(2H,m),6.93(1H,d,J=8.7Hz),8.58(1H,dd,J=0.9 ㉹ 1.8Hz), 7.48(1H,t,J=1.8Hz),7.92(1H,dd,J=0.9 ㉹ 1.8Hz).

IR(CHCl₃):3517,3450,3134,3031,3008,2925,2870,2867,1708,1656,1588,1570, 1514 /cm.

[α]_D=+46.7° (MeOH,c=0.92,25°C).

No.2b-1

[α]_D= +25.6° (MeOH,c=1.01,28°C).

No.2b-2

[α]_D= +88.9° (MeOH,c=1.01,24°C).

No.2c-1

[α]_D= +80.5° (MeOH,c=1.01,22°C).

No.2c-2

[α]_D= +55.8° (MeOH,c=0.92,22°C).

No.2c-3

[α]_D= +54.7° (MeOH,c=1.01,22°C).

No.2d-1

[α]_D= -6.2° (MeOH,c=1.00,21°C).

No.2d-2

[α]_D=+15.8° (MeOH,c=0.34,22°C).

No.2d-3

[α]_D=+81.6° (MeOH,c=1.01,22°C).

No.2e-1

[α]_D= -9.4° (MeOH,c=1.00,22°C).

No.2e-2

[α]_D= -1.8° (MeOH,c=1.02,23°C).

No.2e-3

$[\alpha]_D = -6.7^\circ$ (MeOH, $c=1.01, 23^\circ\text{C}$).

No.2f-1

$[\alpha]_D = +8.8^\circ$ (MeOH, $c=1.01, 23^\circ\text{C}$).

No.2f-2

$[\alpha]_D = -2.8^\circ$ (MeOH, $c=1.00, 22^\circ\text{C}$).

No.2f-3

$[\alpha]_D = -2.5^\circ$ (MeOH, $c=1.01, 22^\circ\text{C}$).

No.2g-1

$[\alpha]_D = +54.6^\circ$ (MeOH, $c=1.01, 24^\circ\text{C}$).

No.3a-2

CDCl_3 , 300MHz

0.98-2.18(14H, m), 2.81(2H, t, $J=7.2\text{Hz}$), 2.35-2.40(1H, m), 3.10-3.20(1H, m),
5.00(1H, d, $J=6.9\text{Hz}$), 5.80-5.48(2H, m), 6.75(1H, d, $J=10.2\text{Hz}$), 7.38-7.52(6H, m),
IR(CDCl_3): 3266, 3028, 2954, 2874, 1709, 1620, 1448, 1412, 1318, 1141, 970, 892/ cm^{-1} .

$[\alpha]_D = +20.2 \pm 0.6^\circ$ (CHCl_3 , $c=1.05, 24^\circ\text{C}$).

No.3a-3

CDCl_3 , 300MHz

0.95-2.00(14H, m), 2.20-2.29(2H, m), 3.00-3.06(1H, m), 3.66(2H, m), 5.00(1H, d,
 $J=6.6\text{Hz}$), 5.18-5.29(2H, m), 7.38-7.52(2H, m), 7.59-7.65(2H, m), 7.69-
7.75(2H, m), 7.92-7.98(2H, m).

IR(CHCl_3): 3376, 3018, 2946, 2868, 1727, 1594, 1486, 1395, 1322, 1157, 1095, 890/ cm^{-1} .

/cm.

$[\alpha]_D = +2.8 \pm 0.4^\circ$ (CHCl_3 , $c=1.03, 23^\circ\text{C}$).

mp. 65-66.5 $^\circ\text{C}$

No.3a-4

CDCl_3 , 300MHz

0.93-2.05(14H, m), 2.15-2.22(1H, m), 2.81(2H, t, $J=7.2\text{Hz}$), 3.01-3.10(1H, m),
5.18-5.31(2H, m), 7.38-7.52(2H, m), 7.58-7.66(2H, m), 7.69-7.75(2H, m), 7.92-
7.98(2H, m)

IR(CHCl_3): 3374, 3260, 3020, 2948, 2868, 1708, 1594, 1479, 1396, 1319, 1156, 1095,
1052, 891/ cm^{-1} .

$[\alpha]_D = +13.1 \pm 0.5^\circ$ (CHCl_3 , $c=1.10, 24^\circ\text{C}$).

No.3a-6

CD_2OD 300MHz

1.04-1.95(14H, m), 2.07(2H, t, $J=7.5\text{Hz}$), 2.14-2.22(1H, m), 2.94-3.00(1H, m),
5.04-5.25(2H, m), 7.38-7.52(2H, m), 7.66-7.71(2H, m), 7.78-7.86(2H, m), 7.91-
7.97(2H, m).

IR(KBr): 3421, 3278, 2951, 2872, 1662, 1481, 1409, 1317, 1156, 1097, 1057, 895/ cm^{-1} .

$[\alpha]_D = -15.3 \pm 0.5^\circ$ (CHCl_3 , $c=1.06, 23^\circ\text{C}$).

mp. 105-112 $^\circ\text{C}$

No.3a-11

CDCl_3 , 300MHz

0.80-2.04(14H, m), 2.05-2.19(1H, m), 2.35(2H, t, $J=7.2\text{Hz}$), 2.95-3.04(1H, m),
5.17-5.32(2H, m), 7.56-7.68(2H, m), 7.88-7.95(2H, m).

IR(CHCl_3): 3260, 3020, 2948, 2868, 1707, 1599, 1486, 1383, 1325, 1268, 1180, 1088,
1058, 1008, 892/ cm^{-1} .

$[\alpha]_D^{25} = +8.3 \pm 0.5^\circ$ (CHCl₃, c=1.00, 22°C).

No. 3a-16

CDCl₃ 300MHz

0.80-1.90(14H,m), 1.98-2.04(1H,m), 2.27(2H,t,J=7.2Hz), 2.88(8H,s), 2.90-2.98(1H,m), 4.88-5.00(2H,m), 5.18(1H,d,J=7.2Hz), 7.18(1H,d,J=7.5Hz), 7.48-7.60(2H,m), 8.26-8.33(2H,m), 8.58(1H,d,J=8.7Hz).

IR(CHCl₃): 3272, 3030, 2948, 2868, 2782, 1708, 1678, 1455, 1407, 1311, 1229, 1160, 1142, 1070, 942, 891/cm.

$[\alpha]_D^{25} = -19.7 \pm 0.6^\circ$ (CHCl₃, c=1.08, 22.5°C).

No. 3a-31

CDCl₃ 300MHz

0.80-1.85(14H,m), 2.02-2.08(1H,m), 2.20(2H,t,J=7.2Hz), 2.88-2.98(1H,m), 2.88(8H,s), 4.80-4.92(2H,m), 4.98(1H,d,J=6.9Hz), 7.50-7.70(2H,m), 7.92-7.98(1H,m), 8.07(1H,d,J=8.4Hz), 8.29(1H,dd,J=1.5&7.5Hz), 8.65(1H,d,J=8.7Hz).

IR(CHCl₃): 3374, 3016, 2946, 2868, 1727, 1506, 1455, 1318, 1160, 1133, 1105, 1051, 954, 890/cm.

$[\alpha]_D^{25} = -89.8 \pm 0.8^\circ$ (CHCl₃, c=1.07, 22°C).

No. 3a-32

CDCl₃ 300MHz

0.80-1.90(14H,m), 1.95-2.05(1H,m), 2.27(2H,t,J=7.2Hz), 2.90-2.98(1H,m), 4.85-5.00(2H,m), 5.23(1H,d,J=6.6Hz), 7.50-7.73(2H,m), 7.95(1H,d,J=8.1Hz), 8.07(1H,d,J=8.4Hz), 8.29(1H,dd,J=1.2&7.5Hz), 8.66(1H,d,J=9.0Hz).

IR(CHCl₃): 3270, 3020, 2948, 2868, 1708, 1455, 1412, 1317, 1159, 1132, 1104, 1079, 1051, 983, 891/cm.

$[\alpha]_D^{25} = -29.2 \pm 0.6^\circ$ (CHCl₃, c=1.06, 22°C).

No. 3a-33

CD₃OD 300MHz

0.94-1.84(14H,m), 1.96-2.08(2H,m), 2.77-2.84(1H,m), 4.67-4.84(2H,m), 7.55-7.75(2H,m), 8.02(1H,d,J=7.5Hz), 8.12-8.28(2H,m), 8.74(1H,d,J=8.7Hz).

IR(KBr): 3482, 3298, 2951, 2872, 1564, 1412, 1315, 1159, 1134, 1107, 1082, 1058, 986/cm.

$[\alpha]_D^{25} = -79.9 \pm 1.2^\circ$ (CH₃OH, c=1.00, 22°C).

No. 3a-34

CDCl₃ 300MHz

0.97-1.91(14H,m), 2.18-2.20(1H,m), 2.42(2H,t,J=7.2Hz), 3.00-3.07(1H,m), 5.06-5.24(2H,m), 5.38(1H,d,J=6.9Hz), 7.57-7.68(2H,m), 7.82-8.00(4H,m), 8.45(1H,d,J=1.2Hz).

IR(CHCl₃): 3260, 3020, 2948, 1708, 1408, 1319, 1154, 1129, 1078, 968, 892/cm.

$[\alpha]_D^{25} = +20.7 \pm 0.6^\circ$ (CHCl₃, c=1.07, 22°C).

No. 3a-35

CD₃OD 300MHz

1.03-2.20(m, 17H), 2.97(m, 1H), 5.02(m, 2H), 7.64(m, 2H), 8.00(m, 4H), 8.43(s, 1H).

IR(KBr): 3380, 3288, 1862, 1407, 1316, 1153, 1130, 1075/cm.

$[\alpha]_D^{25} \approx 0$

$[\alpha]_{488}^{25} = +20.9 \pm 0.6^\circ$ (CH₃OH, c=1.04, 23°C).

No. 3d-1

CDCl₃ 300MHz

0.93-2.58(m, 17H), 3.02(m, 1H), 5.24(m, 2H), 6.48(m, 1H), 7.35-7.60(m, 8H), 7.85-8.00(m, 2H).

IR(나올): 3275, 1548, 1160, 1094, 787, 689, 591, 557/cm.

$[\alpha]_D^{25} = +19.0 \pm .6^\circ$ (CH₃OH, c=1.010, 25°C).

원소분석 (C₂₁H₂₃NO₂ 1/2Ca 1.0 H₂O)

계산치: C, 57.94; H, 6.52; N, 3.38; Ca, 4.88; H₂O, 4.35

측정치: C, 57.80; H, 6.88; N, 3.68; Ca, 5.08; H₂O, 4.50

No.3d-6

$[\alpha]_D^{25} = -2.7 \pm .6^\circ$ (CHCl₃, c=1.00, 24°C).

No.3d-7

$[\alpha]_D^{25} = -3.2 \pm 0.4^\circ$ (CHCl₃, c=1.08, 22°C).

mp. 65-67°C

No.3d-8

$[\alpha]_D^{25} = -14.6 \pm 0.5^\circ$ (CHCl₃, c=1.07, 24°C).

No.3d-9

$[\alpha]_D^{25} = +12.2 \pm 0.5^\circ$ (CH₃OH, c=1.00, 23°C).

mp. 119-125°C

No.3d-10

$[\alpha]_D^{25} = +39.7 \pm 0.8^\circ$ (CHCl₃, c=1.07, 22°C).

No.3d-11

$[\alpha]_D^{25} = +29.2 \pm 0.7^\circ$ (CHCl₃, c=1.06, 22°C).

No.3d-12

$[\alpha]_D^{25} = +78.4 \pm 1.1^\circ$ (CH₃OH, c=1.03, 24°C).

No.3d-14

$[\alpha]_D^{25} = -20.6 \pm 0.6^\circ$ (CHCl₃, c=1.07, 22°C).

No.3d-15

$[\alpha]_{me}^{25} = -28.0 \pm 0.7^\circ$ (CH₃OH, c=1.08, 24.5°C).

No.3d-16

$[\alpha]_D^{25} = -8.7 \pm 0.6^\circ$ (CHCl₃, c=1.06, 22°C).

No.3d-17

CDCl₃ 300MHz

0.80-2.15(m, 24H), 2.82(t, J=7Hz, 2H), 2.68(t, J=7Hz, 2H), 3.02(m, 1H), 2.15(m, 24H), 2.82(t, J=7Hz, 2H), 2.68(t, J=7Hz, 2H), 3.02(m, 1H), 5.22(m, 2H), 5.85(d, J=7Hz, 1H), 7.80(A2B2q-A⁺-⁺, J=8Hz, 2H), 7.81(A2B2qB⁺-⁺, J=8Hz, 2H), 9.86(brs, 1H).

$[\alpha]_D^{25} = 0$

$[\alpha]_{me}^{25} = -9.7 \pm 0.5^\circ$ (CHCl₃, c=1.08, 22°C).

No.3d-24

$[\alpha]_D^{25} = +19.2 \pm 0.6^\circ$ (CHCl₃, c=1.05, 23°C).

No.3d-28

CD₃OD 300MHz

0.90-2.20(20H, m), 2.88(1H, m), 3.07(2H, q, J=7.0Hz), 5.00-5.40(2H, m), 7.20-7.60(4H, m), 7.95(1H, m).

IR(KBr): 3415, 3254, 1698, 1564, 1514, 1154/cm.

No.3d-28

CD₃OD 300MHz

0.90-2.20(30H,m), 2.78(2H,q,J=7.0Hz), 3.98(1H,m), 5.00-5.30(2H,m), 7.40-7.50(2H,m), 7.60-7.77(2H,m).
IR(KBr): 3435, 3280, 1562, 1328, 1204, 1151/cm.

No.3d-30

원소분석 (C₂₀H₂₃BrNO₃Na)

계산치: C50.21; H5.27; Br16.70; N2.92; S6.70; Na4.81

측정치: C50.22; H5.40; Br15.57; N2.88; S6.41; Na5.10

IR(KBr): 3425, 3280, 3085, 1697, 1570, 1410, 1321, 1165, 1155/cm.

No.3e-1

CD₂OD 300MHz

0.71(1H,d,J=10.2Hz), 1.04(3H,s), 1.12(3H,s), 1.85-2.28(14H,m),

2.42(3H,s), 3.17-3.25(1H,m), 5.18-

5.39(2H,m), 7.37(2H,d,J=8.4Hz), 7.75(2H,d,J=8.4Hz).

IR(CHCl₃): 3400, 3289, 2986, 2924, 2870, 1559, 1424, 1322, 1305, 1160, 1095, 1075, 1030/cm.

[α]_D²⁵ = +25.9 ± 0.7° (CH₃OH, c=1.00, 23°C).

상기 실시예에서 제조한 화합물을 하기의 실험 실시예에서 제시하는 방법에 따라 생체내 활성 및 시험관내 활성을 시험하였다.

실험 1 PGD₂ 수용체에의 결합

물질 및 방법

(1) 인간 혈소판 막 분획의 제조

3.8% 나트륨 시트레이트를 함유하는 플라스틱 주사기를 사용하여 건강한 자원자(성인 남자 및 여자)의 정맥으로부터 혈액 샘플을 수득하고, 플라스틱 시험관에 담고, 뒤집어서 부드럽게 혼합하였다. 그 다음, 샘플을 실온에서 1800 rpm으로 10분동안 원심분리시키고, PRP(혈소판이 많은 플라스마; platelet rich plasma)를 함유하는 상청액을 수집하였다. PRP를 실온에서 2300 rpm으로 22분동안 재원심분리시켜 혈소판을 수득하였다. 혈소판을 균질화기 (울트라-투락스(Ultra-Turrax))를 사용하여 균질화시키고, 4°C에서 20,000 rpm으로 10분간 3회 원심분리시켜 혈소판막 분획을 수득하였다. 단백질 측정을 한 후, 막 분획을 2 mg/ml가 되도록 조정하여 사용할 때까지 -80°C의 냉장에서 보존하였다.

(2) PGD₂ 수용체에의 결합

결합-반응 용액(50mM, 트리스(Tris)/HCl, pH 7.4, 5 mM MgCl₂)에 인간 혈소판 막 분획(0.1 mg) 및 5nM [³H]PGD₂(115 Ci/mmol)를 첨가하고, 4°C에서 90분간 반응시켰다. 반응이 완료된 후, 반응 혼합물을 유리 섬유 여과지를 통해 여과하고, 냉각된 식염수로 수 회 세척하고, 여과지에 잔류하는 방사능을 측정하였다. 총 결합에서 비-특이성 결합 (10μM PGD₂의 존재하의 결합)을 빼서 특이성 결합을 계산하였다. 각 화합물의 결합-억제 활성은 결합을 50% 억제하는데 필요한 농도(IC₅₀)로 표현되고, 이것은 화합물의 존재하의 결합 비율(%)을 좌표에 나타내어 치환 곡선을 그려서 결정하며, 이때 시험 화합물의 부재하의 결합비율은 100%이다. 결과를 하기 표에 제시하였다.

화합물 번호	활성 (μM)	화합물 번호	활성 (μM)
3a-4	0.6	2a-4	0.54
1a-115	8.6	2a-17	0.12
1a-28	0.045	2a-21	5.2
1a-47	0.0086	2a-28	0.046
1a-100	0.56	2a-95	1.6
1a-176	0.047	2a-109	0.003
1a-2	0.13	1a-162	0.027

실험 2 인간 혈소판을 사용한 PGD₂ 수용체에 대한 길항 활성 측정

주사기 용적의 1/9를 시트르산/엑스트로즈 용액으로 미리 채운 주사기를 사용하여 건강한 지원자로부터 말초 혈액을 수득하였다. 주사기를 10분 동안 180×g에서 원심 분리시켜 상청액(PRP; 혈소판이 많은 플라스마)을 수득하였다. 수득한 PRP를 3회 걸쳐 세척용 완충액으로 세척하고, 혈소판의 갯수를 마이크로 세포 계수기(micro cell counter)를 사용하여 계수하였다. 혈소판의 최종 농도가 5×10⁸/ml이도록 조정된 현탁액을 37°C로 가온하고, 그 다음 3-이소부틸-1-메틸크산틴(0.5 mM)으로 5분동안 예비처리하였다. 현탁액에 다양한 농도로 희석시킨 시험화합물을 첨가하였다. 10분 후에, 0.1 내지 2.0 μM의 PGD₂를 첨가함으로써 반

응을 유도하였고, 15분 후에 HCl를 첨가함으로써 반응을 종결시켰다. 초음파 균질화기로 혈소판을 파괴하였다. 원심분리후에, 상청액중의 cAMP를 방사 분석하여 결정하였다. 약제의 PGD 수용체 길항작용을 하기와 같이 측정하였다. PGD₂를 첨가함으로써 증가하는 cAMP에 대한 억제율을 각각의 농도에 대하여 측정한 다음, 50% 억제하는데 필요한 약제의 농도(IC₅₀)를 계산하였다. 결과를 하기 표에 제시하였다.

화합물 번호	인간 혈소판 cAMP의 증가 억제율(IC ₅₀)(μ M)
3a-16	0.37
1a-12	12.11
1a-28	0.30
1a-47	2.09
2a-2	0.77
2a-4	0.94
2a-35	1.52
2a-75	0.71

실험 3 코의 폐색증 모델을 사용한 실험

기니아 피그를 사용하여 코 공동 저항성을 측정하고 코 폐색에 대한 저항성을 측정하는 방법을 하기와 같이 기술하였다.

1% 오발부민(OVA) 용액을 초음파 분무기로 처리하여 에어로졸을 수득하였다. 하틀리(Hartley) 수컷 기니아 피그를 1주일 간격을 두고 10분동안 두번 에어로졸을 흡입시켜 증강시켰다. 증강시키고 7일 후, 기니아 피그를 항원에 노출시켜 반응을 개시시켰다. 그 다음, 펜토바비탈(30mg/kg, 복강내)로 마취시킨 상태에서 기관을 절개하여, 폐 및 코의 공동 측면에서 캐놀라(cannula)를 기관으로 삽입하였다. 폐의 측면에 삽입된 캐놀라를, 4ml의 공기를 60 회/분으로 제공하는 인공 호흡기와 연결시켰다. 가라민(2mg/kg, 정맥내)으로 기니아 피그의 자발적인 호흡을 저지시킨 후, 4ml 공기/회의 유속, 70회/분의 빈도로 인공 호흡기가 달린 관의 주둥이에 공기를 공급하였고, 통기에 요구되는 대기압을 분자에 꼭 맞는 변환기를 사용하여 측정하였다. 측정치를 코 공동 저항성의 변수로서 사용하였다. 호흡기 및 코 공동 캐놀라 사이에 3분동안 3% OVA 용액의 에어로졸을 발생시킴으로써 항원에 노출시켰다. 항원에 노출시키기 전에 시험 약제를 10분동안 정맥내 주사하였다. 0 내지 30분 동안 코의 저항성을 연속적으로 측정하였고, 그 효과를 지표로서 30분 동안 AUC를 사용하여 부형제에 대하여 수득한 효과에 대한 억제율로 표시한다(y축 : 코 공동의 저항성 (cm, H₂O), x축 : 시간 (0 내지 30분)). 결과는 하기와 같다.

화합물 번호	억제율(%) 1mg/kg (정맥내)	비고
1a-28	44	
1a-98	69	
1a-100	50	
1a-115	66	
1a-116	48	
1a-120	58	3 mg/kg (정맥내)
1a-2	82	
1a-162	80	
1a-176	60	
1a-267	62	
2a-4	60	
2a-21	52	
2a-28	54	
2a-95	77	
2a-96	77	10 mg/kg (경구)
2a-109	73	
2a-110	66	10 mg/kg (경구)
22a-194	79	

제형에 1 정제의 제조

mg 정제의 성분은 하기와 같다.

칼슘 (+)-(Z)-7-[(1R,2S,3S,4S)-3-벤젠설포나미도비사이클로[2.2.1]헵트-2-일]-5-헵테노에이트 이수화물	40.0 mg
하이드록시프로필 셀룰로즈	3.6 mg
마그네슘 스테아레이트	0.4 mg
옥수수전분	18.0 mg
락토즈	58.0 mg
총	120.0 mg

제형에 2 과립의 제조

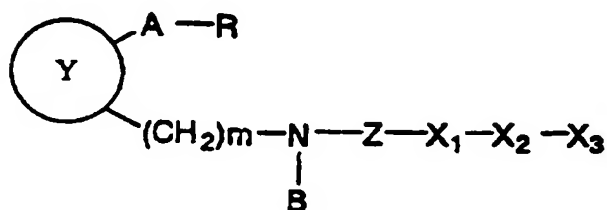
성분은 다음과 같다.

칼슘 (+)-(Z)-7-[(1R,2S,3S,4S)-3-벤젠설포나미도비사이클로[2.2.1]헵트-2-일]-5-헵테노에이트 이수화물	100.0 mg
하이드록시프로필 셀룰로즈	30.0 mg
카멜로즈 칼슘	30.0 mg
완석	10.0 mg
폴록사머(Poloxamer) 188	20.0 mg
결정질 셀룰로즈	70.0 mg
옥수수전분	300.0 mg
락토즈	440.0 mg
총	1000.0 mg

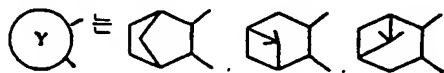
(57) 청구의 범위

청구항 1. 활성 성분으로서 하기 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물을 포함하는 프로스타글란딘 디2 (PGD₂)길항제:

화학식 I



상기 식에서,



또는 이고,

A는 선택적으로 쇠중에 헤테로 원자 또는 페닐렌을 함유하고, 옥소기를 함유하고/ 함유하거나, 불포화 결합을 갖는 알킬렌이고;

B는 수소, 알킬, 아르알킬 또는 아실이고;

R는 COOR₁, CH₂OR₂ 또는 CON(R₃)R₄이고;

R₁은 수소 또는 알킬이고;

R₂는 수소 또는 알킬이고;

R₃ 및 R₄는 각각 독립적으로 수소, 알킬, 하이드록시 또는 알킬설포닐이고;

X₁은 단일 결합, 페닐렌, 나프틸렌, 티오펜디일, 인돌디일 또는 옥사졸디일이고;

X_2 는 단일 결합, $-N=N-$, $-N=CH-$, $-CH=N-$, $-CH=N-N$, $-CH=N-O-$, $-C=NNHCSNH-$, $-C=NNHCONH-$, $-CH=CH-$, $CH(OH)-$, $-C(C1)=C(C1)-$, $-(CH_2)_n-$, 에틸렌, $-N(R_5)-$, $-N(R_{51})CO-$, $-N(R$

$_{52})SO_2-$, $-N(R_{53})CON(R_{54})-$, $-CON(R_{55})-$, $-SO_2N(R_{56})-$, $-O-$, $-S-$, $-SO-$, $-SO_2-$, $-CO-$, 옥사디아졸디일, 티아디아졸디일 또는 테트라졸디일이고;

X_3 은 알킬, 알켄일, 알킨일, 아릴, 아르알킬, 헤테로사이클릭 기, 사이클로알킬, 사이클로알켄일, 티아졸린일 리덴메틸, 티아졸리딘일리덴메틸, $-CH=NR_6$ 또는 $-N=C(R_7)R_8$ 이고;

R_5 , R_{51} , R_{52} , R_{53} , R_{54} , R_{55} 및 R_{56} 은 각각 수소 또는 알킬이고;

R_6 은 수소, 알킬, 하이드록시, 알콕시, 카바모일옥시, 티오카바모일옥시, 우레이도 또는 티오우레이도이고;

R_7 및 R_8 은 각각 독립적으로 알킬, 알콕시 또는 아릴이고;

n 은 1 또는 2이고;

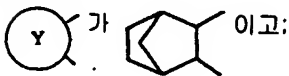
Z 는 $-SO_2-$ 또는 $-CO-$ 이고;

m 은 0 또는 1이며;

이때, 사이클릭 치환체는 니트로, 알콕시, 설파모일, 치환된- 또는 비치환된-아미노, 아실, 아실옥시, 하이드록시, 할로겐, 알킬, 알킨일, 카복시, 알콕시카보닐, 아르알콕시카보닐, 아릴옥시카보닐, 메실옥시, 시아노, 알켄일옥시, 하이드록시알킬, 트리플루오로메틸, 알킬티오, $-N=PPh_3$, 옥소, 티옥소, 하이드록시이미노, 알콕시이미노, 페닐 및 알킬렌디옥시로 구성된 그룹중에서 선택된 1 내지 3개의 치환체를 가질 수도 있다.

청구항 2. 제 1 항에 있어서,

활성 성분이,



m 이 0이고;

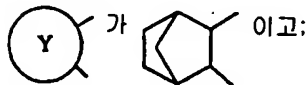
Z 가 SO_2 이고;

X_1 및 X_2 가 둘다 단일 결합이고;

X_3 이 알킬, 페닐, 나프틸, 스티릴, 퀴놀릴 또는 티엔일인(이들 치환체중의 사이클릭 치환체는 선택적으로 니트로, 알콕시, 치환된- 또는 비치환된-아미노, 할로겐, 알킬 및 하이드록시알킬에서 선택된 1 내지 3개의 치환체를 가짐) 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물인 PGD₂ 길항제.

청구항 3. 제 1 항에 있어서,

활성 성분이,



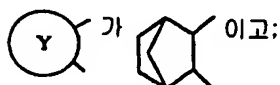
m 이 1이고;

X_1 및 X_2 가 둘다 단일 결합이고;

X_3 이 선택적으로 할로겐으로 치환된 페닐인 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물인 PGD₂ 길항제.

청구항 4. 제 1 항에 있어서,

활성 성분이,



m 이 1이고;

X_1 이 페닐이고;

X_2 가 $-CH_2-$ 또는 $-N=N-$ 이고;

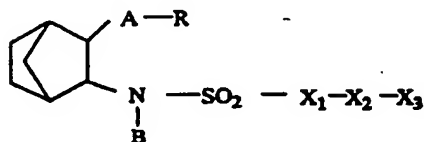
X_3 이 페닐인 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물인 PGD₂ 길항제.

청구항 5. 제 1 항에 있어서,

코의 폐색증을 치료하기 위한 약제인 PGD₂ 길항제.

청구항 6. 하기 화학식 Ia의 화합물 또는 그의 염 또는 이들의 수화물:

화학식 Ia



상기 식에서,

A, B, R, X₁, X₂ 및 X₃은 화학식 Ia에 대하여 정의한 바와 같고,

단, (1) X₁ 및 X₂가 단일 결합이고, X₃이 치환된- 또는 비치환된-페닐 또는 나프틸인 경우와 (2) A가 5-헵텐 일렌이고, R이 COOR₁(이때, R₁은 수소 또는 메틸임)이고, X₁이 1,4-페닐렌이고, X₂가 단일 결합이고, X₃이 페닐인 경우를 제외한다.

청구항 7. 제 6 항에 있어서,

X₁ 및 X₂가 단일 결합이고 X₃이 이속사졸일, 티아디아졸일, 이소티아졸일, 모폴일, 인돌일, 벤조푸릴, 디벤조 푸릴, 디벤조디옥신일, 벤조티엔일, 디벤조티엔일, 카바졸일, 크산텐일, 페난트리딘일, 디벤조옥시펜일, 디벤 조티에핀일, 시놀일, 크로멘일, 벤즈이미다졸일 또는 디하이드로벤조티에핀일이고, A, B 및 R이 제 1 항에서 정의한 바와 같은 화합물 또는 그의 염 또는 이들의 수화물.

청구항 8. 제 6 항에 있어서,

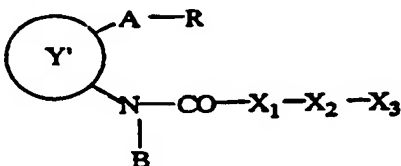
X₁이 단일 결합이고, X₂가 페닐렌이고, X₃이 알켄일, 알킨일, -CH=NR₆ 또는 -N=C(R₇)R₈이고, A, B, R, R₆, R₇ 및 R₈이 제 1 항에서 정의한 바와 같은 화합물 또는 그의 염 또는 이들의 수화물.

청구항 9. 제 6 항에 있어서,

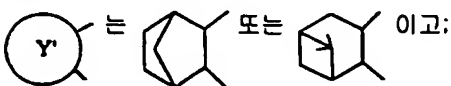
R이 COOR₁이고, X₁이 페닐렌 또는 티오펜디일이고, X₂가 단일 결합, -N=N-, -CH=CH-, -CONH-, -NHCO- 또는 에틴일렌이고, X₃이 페닐, 티아졸리딘리덴메틸, 티아졸리딘리덴메틸 또는 티엔일이고, A, B, R₁, R₆, R₇ 및 R₈이 제 1 항에서 정의한 바와 같은 화합물 또는 그의 염 또는 이들의 수화물.

청구항 10. 하기 화학식 Ib의 화합물 또는 그의 염 또는 이들의 수화물:

화학식 Ib



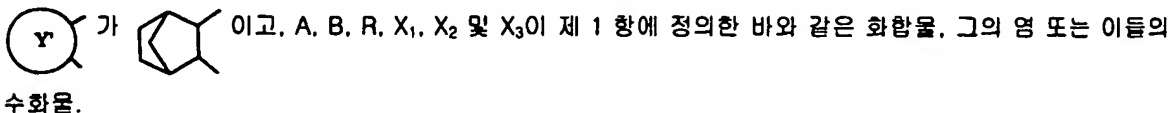
상기 식에서,



A, B, R, X₁, X₂ 및 X₃은 화학식 Ia에 대하여 정의한 바와 같고,

단, X₁ 및 X₂가 단일 결합이고, X₃이 페닐인 경우와 X₁이 단일 결합이고, X₂가 -O-이고, X₃이 벤질인 경우를 제외한다.

청구항 11. 제 10 항에 있어서,



청구항 12. 제 11 항에 있어서,

R이 COOR₁(이때, R₁은 제 1 항에서 정의한 바와 같음)인 화합물, 그의 염 또는 이들의 수화물.

청구항 13. 제 11 항에 있어서,

X₁이 페닐렌 또는 티오펜디일이고, X₂가 단일 결합, -N=N-, -CH=CH-, 에틴일렌, -O-, -S-, -CO-, -CON(R₅₅)- (이때, R₅₅는 제 1 항에서 정의한 바와 같음), -N(R₅₁)CO- (이때, R₅₁은 제 1 항에서 정의한 바와 같음)

음)이고, X_3 이 페닐 또는 티엔일인 화합물, 그의 염 또는 이들의 수화물.

청구항 14. 제 10 항에 있어서,



들의 수화물.

청구항 15. 제 14 항에 있어서,

B가 수소이고, X_1 및 X_2 가 둘다 단일 결합이고, X_3 이 티엔일, 티아졸일, 티아디아졸일, 이소티아졸일, 피롤일, 피리달, 벤조푸릴, 벤즈이미다졸일, 벤조티엔일, 디벤조푸릴, 디벤조티엔일, 퀴놀일 또는 인돌일인 화합물, 그의 염 또는 이들의 수화물.

청구항 16. 제 15 항에 있어서,

X_1 이 페닐렌, 티오펜디일, 인돌디일 또는 옥사졸디일이고, X_2 가 단일 결합, $-N=N-$, $-CH=CH-$, 에틴일렌, $-S-$ 또는 $-O-$ 이고, X_3 이 아릴 또는 헤테로사이클릭 기인 화합물, 그의 염 또는 이들의 수화물.

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